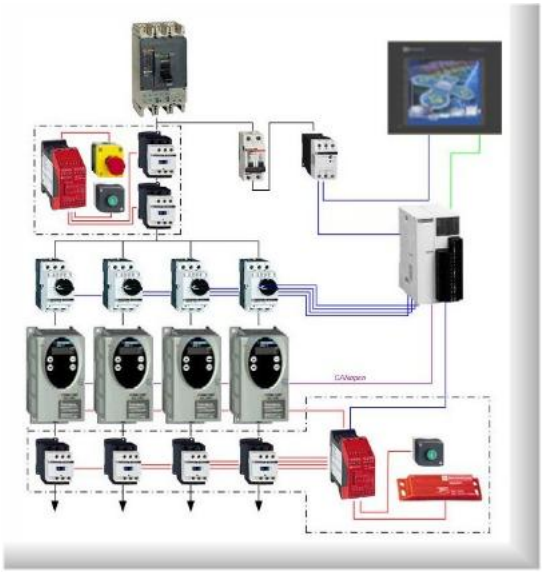
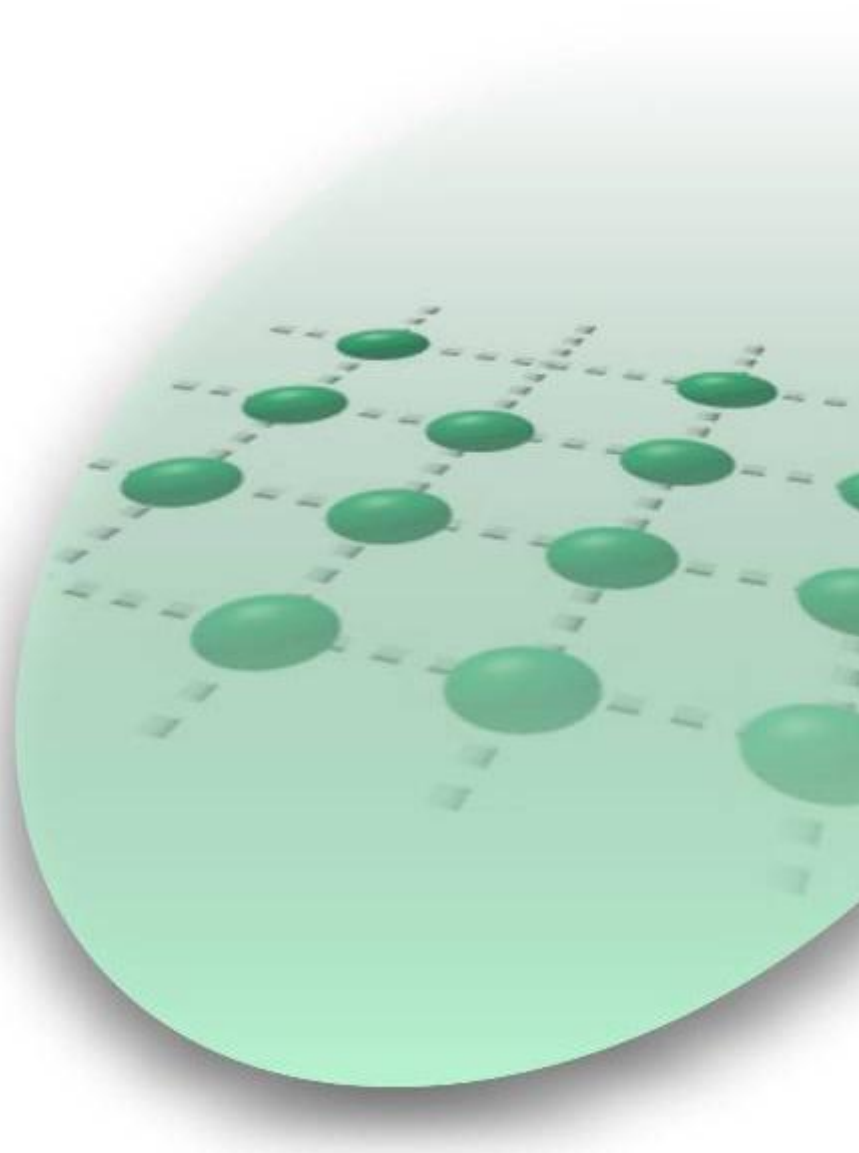
Twido and Altivar with CANopen

System User Guide

[source code]





Preferred Implementation:
Compact Evolutive Optimized

33003584.04

Merlin Gerin
Square D
Telemecanique

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SEP 2006

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Introduction

This document is intended to provide a quick introduction to the described System.
It is **not** intended to replace any specific product documentation. On the contrary, it offers additional information to the product documentation, for installing, configuring and starting up the system.

A detailed functional description or the specification for a specific user application is **not** part of this document. Nevertheless, the document outlines some typical applications where the system might be implemented.

Abbreviations

Word / Expression	Signification
AC	Alternating Current
Advantys	SE product name for a family of I/O modules
Altivar (ATV)	SE product name for a family of VSDs
CANopen	Name for a communications maschine bus system
CB	Circuit Breaker
CoDeSys	Hardware-independant IEC 61131-3 programming software
ConneXium	SE product name for a Family of Transparent Factory devices
DC	Direct Current
EDS	Electronic Data Sheet
E-OFF, E-STOP	Emergency Off switch
Harmony	SE product name for a family of switches and indicators
HMI	Human Machine Interface
I/O	Input/Output
IclA (ICLA)	SE product name for a compact drive
Lexium/Lexium05/LXM	SE product name for a family of servo-drives
Magelis	SE product name for a family of HMI-Devices
MB - SL	SE name for a serial Modbus communications protocol
Micro	SE product name for a middle range family of PLCs
NIM	SE product name for a Network Interface Module
Osiswitch	SE product name for a family of position switches
PC	Personal Computer
Phaseo	SE product name for a family of power supplies
PLC	Programmable Logic Computer
Powersuite	An SE software product for configuring drives
Premium	SE product name for a middle range family of PLCs
Preventa	SE product name for a family of safety devices
PS1131 (CoDeSys)	SE Product name for PLC programming software with CoDeSys
PS	Power Supply
SE	Schneider Electric
Sycon	SE product name of a Field bus programming software
Telefast	SE product name for a series of distributed I/O devices
TesysU	SE product name for a decentralised I/O System
Twido	SE product name of a middle range family of PLCs
TwidoSuite	SE Product name for a PLC programming software
TwidoSoft	SE product name for a PLC programming software
Unity (Pro)	SE product name for a PLC programming software
Vijeo Designer	An SE software product for programming Magelis HMI devices
VSD	Variable Speed Drive
WxHxD	Dimensions : Width, Height and Depth
XBT-L1000	An SE software product for programming Magelis HMI devices
Zelio	SE product name for a low range PLC family
ZelioSoft	SE product name for a PLC programming software

Application Source Code

Introduction

Examples of the source code and wiring diagrams used to attain the system function as described in this document can be downloaded from our website under this link.

The example source code is in the form of configuration, application and import files. Use the appropriate software tool to either open or import the files.

Extension	File Type	Software Tool Required
AIW	Configuration File	Advantys
CNF	Configuration File	Sycon
CO	CANopen definitions file	Sycon
CSV	Comma Seperated Values, Spreadsheet	Twidosoft
CTX		Unity
DCF	Device Configuration File	Advantys
DIB	Device Independent Bitmap	Sycon
DOC	Document file	Microsoft Word
DOP	Project File	Magelis XBTL
EDS	Electronic Data Sheet – Device Definition	Industrial standard
FEF	Export file	PL7
GSD	EDS file (Geraete Stamm Datei)	Profibus
ISL	Island file, project file	Advantys
PB	Profibus definitions file	Sycon
PDF	Portable Document Format - document	Adobe Acrobat
PRO	Project File	PS1131 - CoDeSys
PS2	Export file	Powersuite export file
RTF	Rich Text File - document	Microsoft Word
STU	Project file	Unity Pro
STX	Project file	PL7
TLX	Project file	Twinline control tool
TWD	Project file	TwidoSoft
VDZ	Project file	Vijeo Designer
XEF	Export file	Unity Pro
ZM2	Project File	Zeliosoft

Typical Applications

Introduction

Here you will find a list of the typical applications where this system/subsystem can be applied:

Industrial

- Small to middle sized automated machines
- De-centralised automated sub systems serving as components in large or middle sized machines

Machines

- Packaging Machines and box folders
- Palette wrappers

Food & Drug

- Drying Plants
- Conveyor ovens

Application	Description	Eample
Packaging machines or Box folders.	These machines are often used as feeder components in larger confectioning and filling systems.	
Wrappers for Palettes.	These machines wrap palettes so that the layers of goods are securely held on the palette. These stand alone machines can be integrated into production lines.	
Drying plants and conveyor ovens.	Used as Components in larger system where products need to be dried.	

System

Introduction

The system chapter describes the architecture, the dimensions, the quantities and different types of components used within this system.

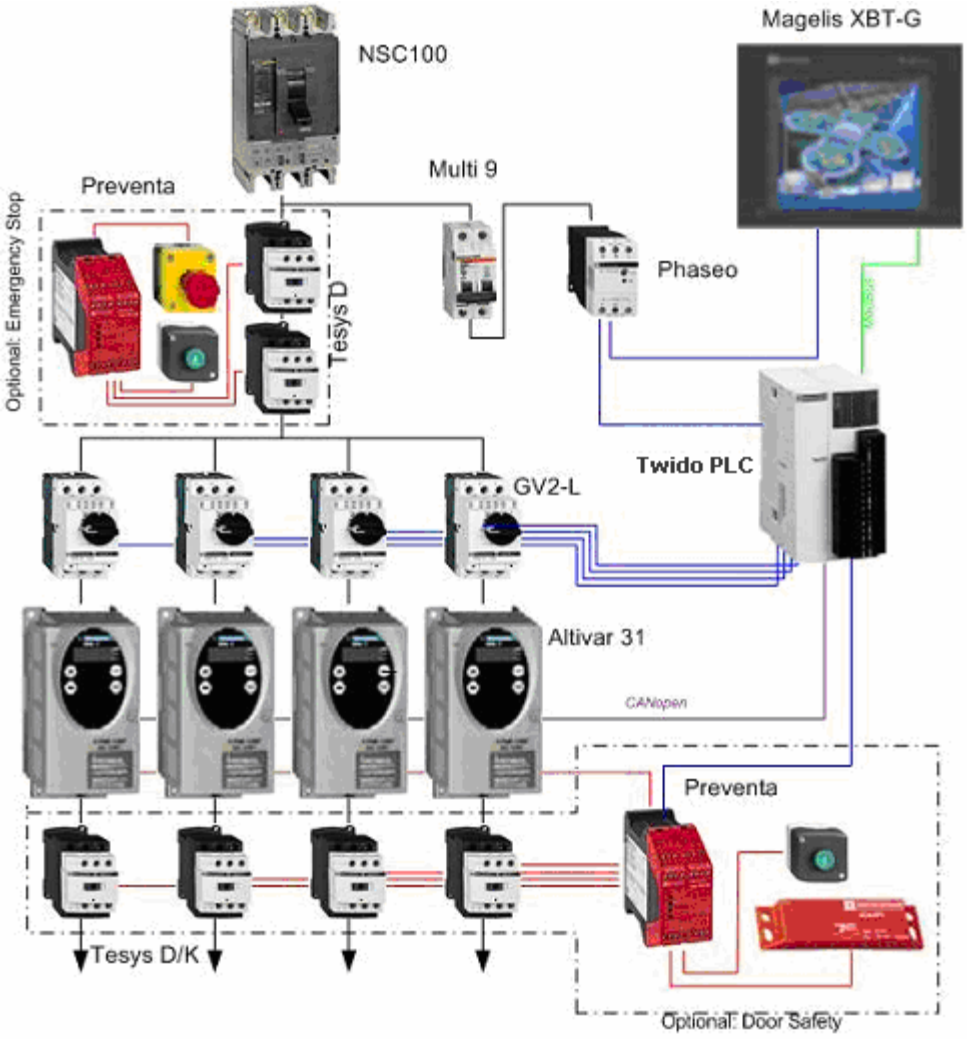
Architecture

General

The PLC in this application is a Twido. The user can control the application using the Magelis HMI device.
The motor drives, connected to the PLC via a CANopen bus, are of type Altivar 31.

The example application includes two safety options; A tamper free emergeny off function supervised with a Preventa safety module and a second safety module to evaluate protective door sensors.

Layout



Components

Hardware:

- Mains switch type Compact NSC100 sag protection and indicator
- Contactor GV2-L (Short Circuit protected) for the motor drives
- Motor drive type Altivar ATV31 with integrated CANopen interface
- Power circuit breakers of type Tesys K and Tesys D (LP1K und LC1D)
- Emergency off switch with rotation release (tamper free)
- Emergency off safety module of type Preventa XPSAC
- Power Supply Phaseo ABL7
- Modular/Compact PLC TWIDO with CANopen module
- Compact, colour display HMI device Magelis XBT-G
- Buttons and indicators XB5 of type Harmony Style 5
- Standard rotary current motors

Software:

- Twidosuite Version 1.0
- PowerSuite V2.3
- Vijeo-Designer V4.4

Quantities of Components

For a complete and detailed list of components, the quantities required and the order numbers, please refer to the components list at the rear of this document.

Degree of Protection

Not all the components in this configuration are designed to withstand the same environmental conditions. Some components may need additional protection, in the form of housings, depending on the environment in which you intend to use them. For exact environmental details of the individual components please refer to the appropriate user manual.

Technical data

Mains voltage	400V AC
Power requirement	Approx. 11 kW
Drive power rating	2x 0,37 kW, 2x 0,55 kW
Motor brake	none
Connection	5x 2,5mm² (L1, L2, L3, N, PE)
Safety Level	category 3 (optional)

Safety Notice

As there are no moving mechanical parts in this application example, category 3 (according to EN954-1) has been selected as an optional safety level. However, the standard and level of safety you apply to your application is determined by your system design and the overall extent to which your system may be a hazard to people and machinery.

Whether or not safety category 3 should be applied to your system should be ascertained with a proper risk analysis.

This document is not comprehensive for any systems using the given architecture and does not absolve users of their duty to uphold the safety requirements with respect to the equipment used in their systems or of compliance with either national or international safety laws and regulations.

Dimensions

The dimensions of the individual devices used; PLC, Drive, Power supply, etc. require a housing cabinet size of at least 800x600x300mm (WxHxD).

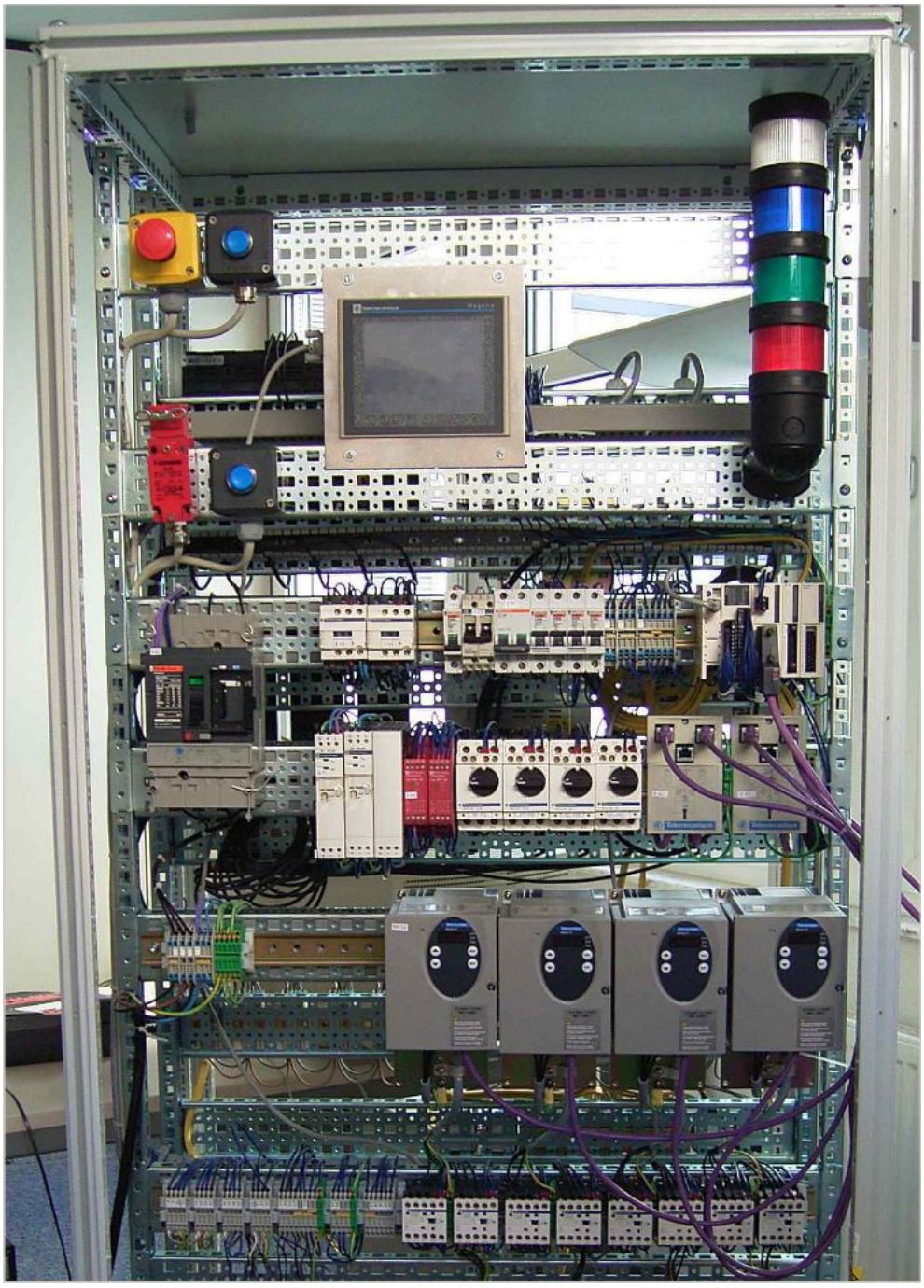
The HMI display, illuminated indicators such as „SYSTEM ON“, „SYSTEM OFF“ or „ACKNOWLEDGE EMERGENCY OFF“ as well as the emergency off switch itself, can be built into the door of the control cabinet.

Installation

Introduction

This chapter describes the steps necessary to set up the hardware and configure the software for the described application.

Layout



Note

This document describes the implementation of a palette wrapper as a sub-system within a larger paletting system.

The modules and I/O here listed are a representative cross section of the modules and indicators required to implement the application as defined in this document and will without doubt differ from your own specific application.

PLC I/O Wiring

Type	I/O	Designation
Twido-PLC Inputs	I 0.0	Not used, reserved for fast counters
	I 0.1	Not used, reserved for fast counters
	I 0.2	Emergency off OK
	I 0.3	Door Safety OK
	I 0.4	Magnetic CB Drive #1 OK
	I 0.5	Magnetic CB Drive #2 OK
	I 0.6	Magnetic CB Drive #3 OK
	I 0.7	Magnetic CB Drive #4 OK
	I 0.8	Pallet arriving (HW-indicator)
	I 0.9	Pallet on turntable in Stop position
	I 0.10	Turn turntable slowly
	I 0.11	Stop position turntable
	I 2.0	lower End position wrapping sled
	I 2.1	upper End position wrapping sled
	I 2.2	Wrapper arm activated
	I 2.3	Removal track ready (HW-indicator)
	I 2.4	Pallet was received (HW-indicator)
	I 2.5	Wrapping Torn
		Optional:
	I 2.6	*Detect Pallet Height*
	I 2.7	*Wrapper arm extended*
	I 2.8	*Wrapper arm retracted*
	I 2.9	*Cutter open*
	I 2.10	*Cutter closed*
	I 2.11	*Gap Control arrival*
	I 2.12	*Gap Control Departure*
	I 2.13	*Wrapping Minimum thickness*
Twido-PLC Outputs	Q 0.0 (Trans)	Display - emergency off acknowledge
	Q 0.1 (Trans)	Display - Safety door acknowledge
	Q 0.2	Signal lamp red (error in system)
	Q 0.3	Signal lamp green (running, Automatic)
	Q 0.4	Signal lamp white (System on)
	Q 0.5	Signal lamp blue (Safety door error)
	Q 0.6	System on
	Q 0.7	Wrapper is ready (HW-indicator)
	Q 3.0	Pallet accepted (HW-indicator)
	Q 3.1	Extend Wrapper arm
	Q 3.2	Cut wrapping
	Q 3.3	Pallet ready for departure (HW-indicator)

Wiring Twido

Twido Power supply	Com (Inputs)	0V DC reference potential
	-V	0V DC reference potential
	Com (+)	+24V DC
	Com 1	+24V DC
	Com 2	+24V DC
	Com 3	+24V DC

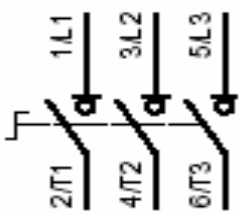
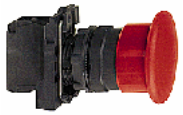
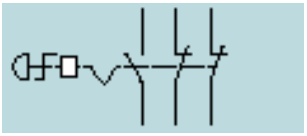
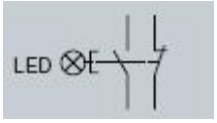
Wiring Motor Drives

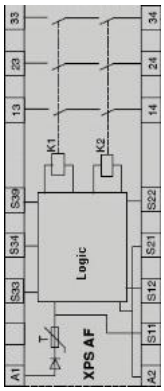
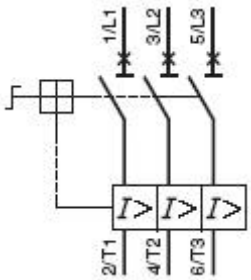
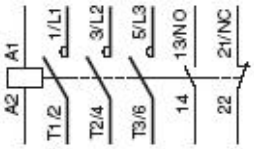
ATV31		No Status i.e. No digital or Analog I/O

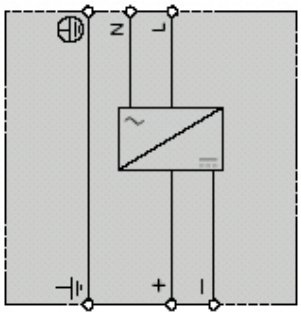
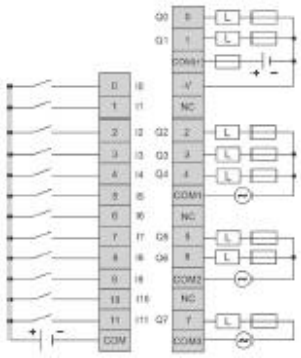
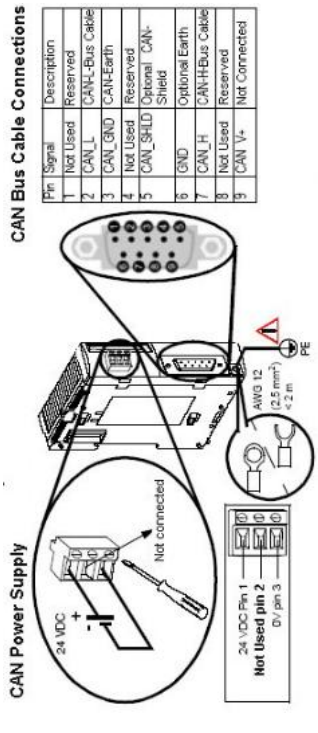
Hardware

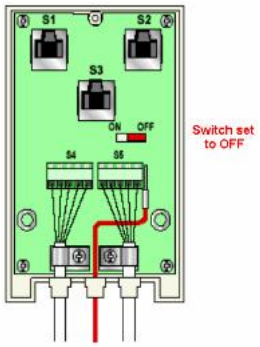
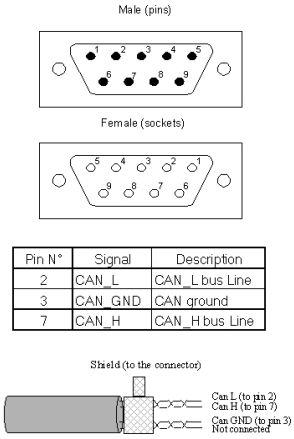
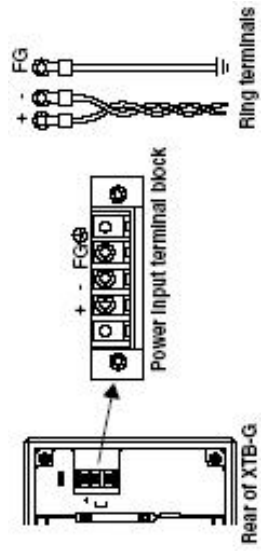
General

- The mains switch, including sag protection and indicator can be set up on a mounting plate.
- The components to be including in a housing, i.e. Twido-PLC, Phaseo-Power Supply, emergency off switch, circuit breaker, contactors, can be mounted (snap on) on a 35mm DIN rail.
- The motor drive can either be screwed directly to a mounting plate or, with the use of an adapter, also be mounted on a DIN rail.
- The emergency off, door safety actuator, signal column as well as the acknowledgment battery are designed for rear wall mounting. All switches (except the door safety sensor) can be mounted without their housings in a cabinet or cabinet door.
- The XB5 buttons and indicators can either be mounted in the front door of a housing with a 22mm cutout or mounted in an XALD housing for direct wall mounting.
- The wiring schemes for the individual components can be found in the detailed wiring diagram attached.

Mains Switch **NSC 100 Compact**		
Emergency OFF switch for cabinet door mounting **XB5AS844 + XB5AZ141** **Incl. E-OFF label ZBY9330**	 	
Indicator Press Button (Series Harmony Style 5) **XB5**		

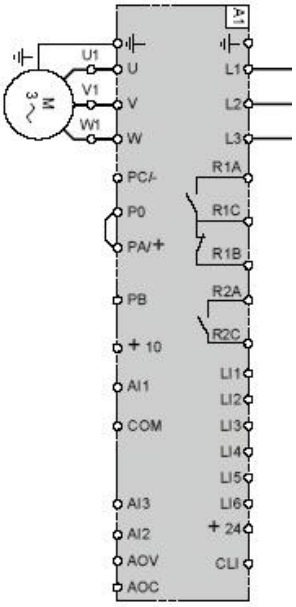
Emergency Off Safety relay **XPS AC5121**		
Contactor (Short circuit protected) **GV2-L**		
Load contactor **LC1D18P7** **LP4K0601BW3**		

Power supply Phaseo **ABL7RE2403** **ABL7RE2405**		
PLC Twido **Modular Device** **TWDLMDA20DRT**		
PLC Twido **Interface Module** **CANopen Master** **TWDNCO1M**		

CANopen-TAP **VW3CANTAP2**		 Pin Signal Description 1 GND Ground 2 CAN_L CAN_L bus line 3 SHLD Optional shield 4 CAN_H CAN_H bus line 5 (V+) Optional supply (1) **(the image shows a device with the end resistor switched off and 2 CAN cables attached)**
CANopen – Plug **TSX CAN KCFD 180 T with integrated terminal resistor for linking to the Twido-CANopen-Master** **CANopen – Cable** **TSX CAN CA 50**		 Pin N° Signal Description 2 CAN_L CAN_L bus Line 3 CAN_GND CAN ground 7 CAN_H CAN_H bus Line
Magelis HMI Display **XBT-G2330**		

Motor Drive
Altivar ATV31

ATV31 H037 N4
ATV31 H055 N4



Terminal Description

Terminal	Function
⏚	Ground terminal
R/L1 S/L2	Power supply
R/L1 S/L2 T/L3	
PO	DC bus + polarity
PA/+	Output to braking resistor (+ polarity)
PB	Output to braking resistor
PC/-	DC bus - polarity
U/T1 V/T2 W/T3	Outputs to the motor

Software

General

The main programming work lies in the programming of the Twido PLC, the configuration of the CANopen bus and creating the faceplates for the HMI display.

Programming the Twido PLC is done using **Twidosuite**.

Die HMI application on the Magelis XBT-G 2330 display is created using **Vijeo Designer**.

Although the motor drives can be configured using the front panels on the drivers themselves, it is recommended that you use the **PowerSuite** tool. Powersuite not only offers you more comfort for the configuration but also offers possibilites for saving and archiving your configration. Not only does it allow to do a quick recovery, returning the motor drive to factory mode, it also allows you to test your configuration online and make online adjustments and optimisations during the test session. The software packet is delivered with the altivar

Your PC must have the appropriate Microsft windows operating system installed:

- Windows 2000 *or*
- Windows XP.

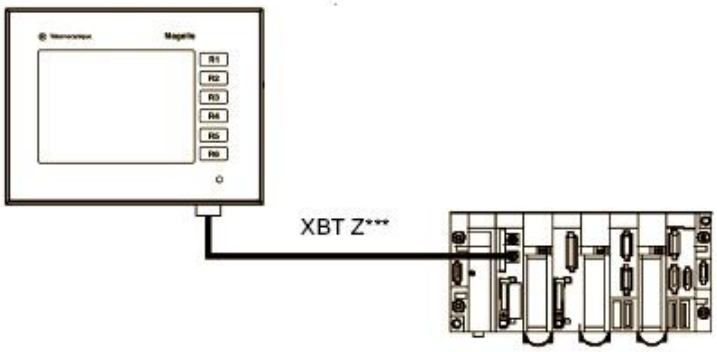
The software tools have the following default install paths:

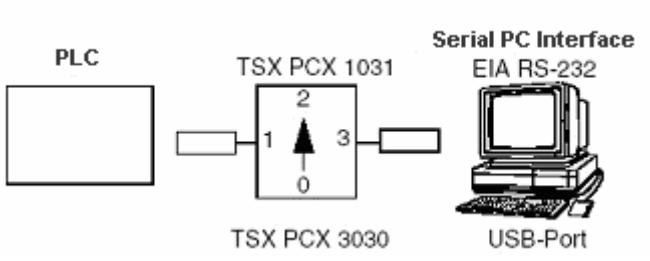
- TwidoSuite:
  C:\Programs\Schneider Electric\TwidoSuite
- Vijeo-Designer:
  C:\Programs\Schneider Electric\VijeoDesigner
- PowerSuite:
  C:\Programs\Schneider Electric\PowerSuite

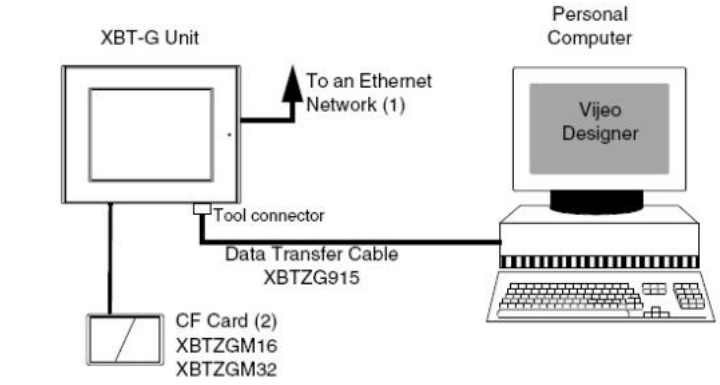
Communication

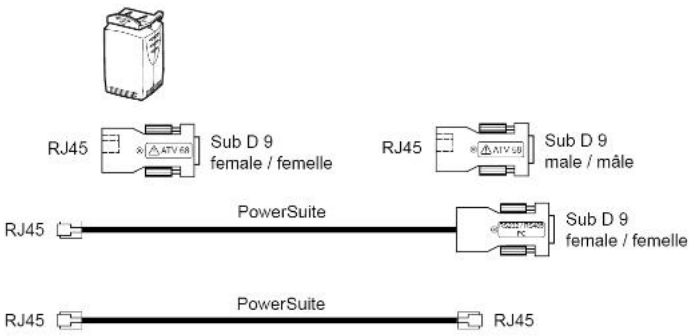
General

This chapter describes the hardware used for data communications (CANopen) and the use of programming cables used in configuring the individual devices of the system.

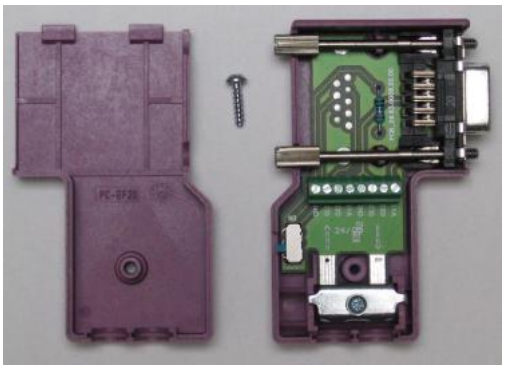
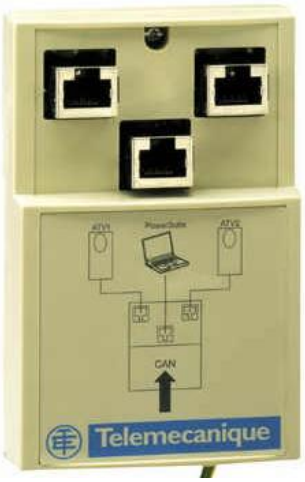
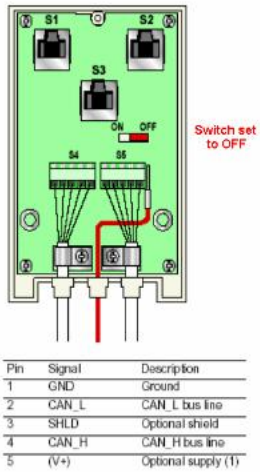
HMI <> Twido	The data transfer between the Magelis-Terminal and the Twido-PLC is implemented with a Modbus connection. For this connection the communication cable **XBTZG915** is required. The necessary Modbus drivers are included both in the software for the Magelis panel and Twido PLC.
Magelis Communication Cable **XBTZG915**	

Twido <> PC	For programming the Twido PLC the programming cable **TSXPCX1031 (serial)** or **TSXPCX3030 (USB)** is required. Note: the switch integrated into the cable must be set to position **2**. **Port 1** on the PLC must be configured for point to point communication.
Twido-Programming Cable **TSX PCX 1031 (serial) or TSX PCX 3030 (USB)**	

HMI <> PC	The data communcation between the HMI XBTGT1000 and the dem PC during configuration is done using the communication cable XBTGZ915. This cable comes with the Vijeo-Designer software packet.
XBTG-Programming Cable **XBTGZ915**	 (1) not available on XBT-G2110/2120/2220/4320 (2) not available on XBT-G2110

ATV31 <> PC	Programming the Altivar is done using the cable **VW3A8106** and the Powersuite cable RJ45<>SubD9 (black).
ATV31-Programming Cable **VW3A8106**	

CANopen

CANopen Master Module **TWDNCO1M** The CANopen-Interface-Module is plugged into the Twido PLC and has a Sub-D-9 CANopen connection	
CANopen Plug **TSXCANKCDF90T** Use this plug on the **TWDNCO1M**. Plug includes a terminal resistor. **CANopen-Kabel TSXCANCD50** Flexibles Kabel	
CANopen-TAP **VW3CANTAP2** Connection for 2 drives of type Altivar 31. Configuration port for use with PowerSuite. Terminal resisitor can be selected using the **ON /OFF** switch. The image shows the resistor set to **OFF.**	 
CanOpen Branch Cable **VW3CANRR1** Connects the TAP to the Altivar 31 with two RJ54 plugs.	

Implementation

Introduction

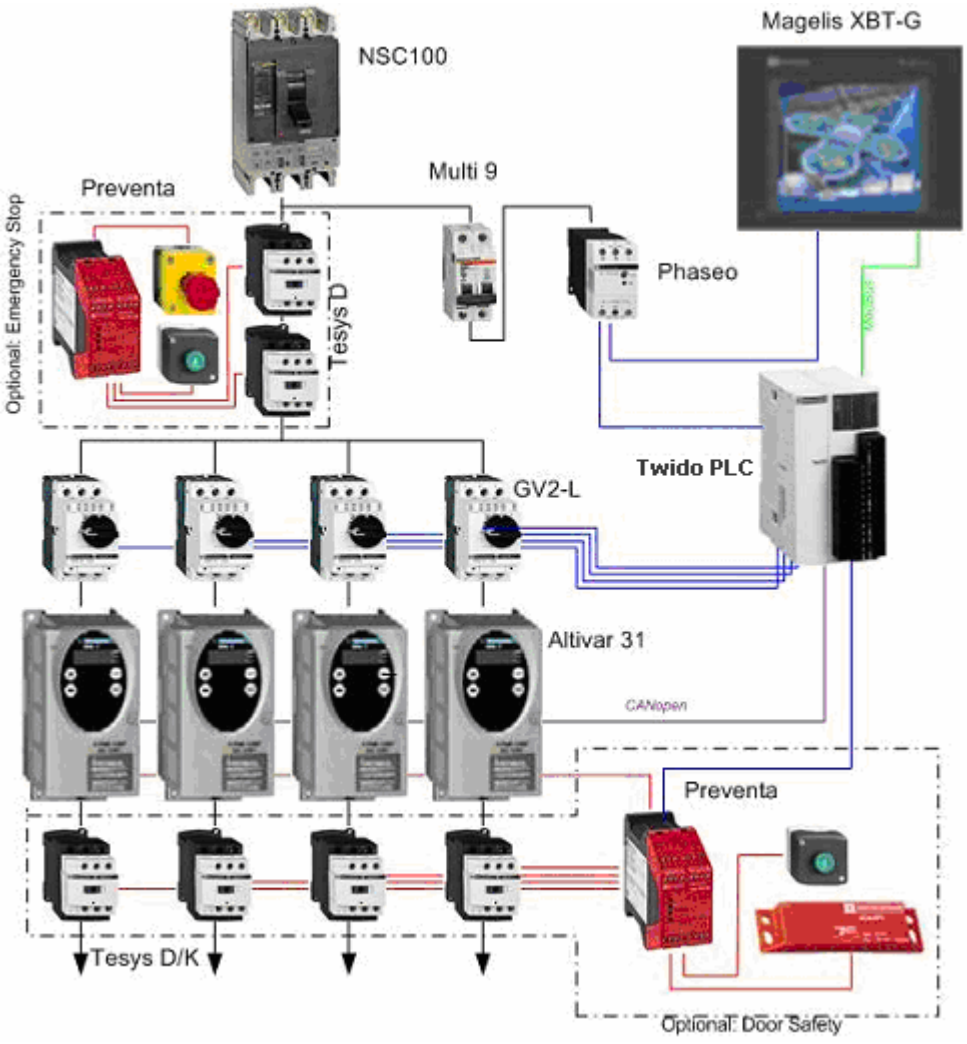
The implementation chapter describes all the steps necessary to initialise, configure to program and start-up the system.

Function

Start up and functional description

1. Switch on all fuses and contactors. The master switch is off.
2. Acknowledge the emergency off
3. Switch on at mains switch
4. Check safety door(s) and acknowledge
5. Wait for the red light to turn off
6. You can now select **automatic** or **manual** mode on the HMI screen
7. Manual Mode: Using the screen TEST you can select on control an individual moter drive.
8. Automatic Mode: Using the screen CONFIGURE you can adjust the speed parameters and the number of top and bottom wrapping layers. The button DEFAULT SETTINGS re-installs the default factory setup.
9. Select APPLICATION via the main menu to observe the individual steps of the process or start a simulation
10. Use the DIAGNOSE displays to control error messaging and observe the individual drive status.

Layout



HMI

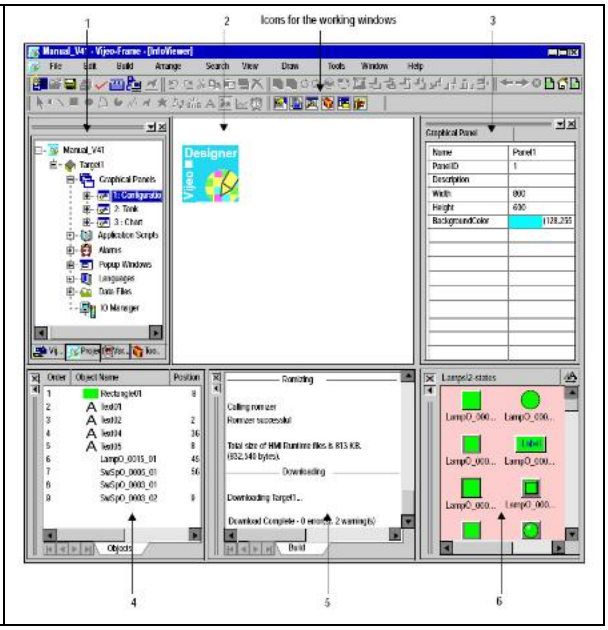
Introduction

This section describes the steps needed to create the Magelis images. For this we use Vijeo Designer.

Setting up the HMI is done as follows:

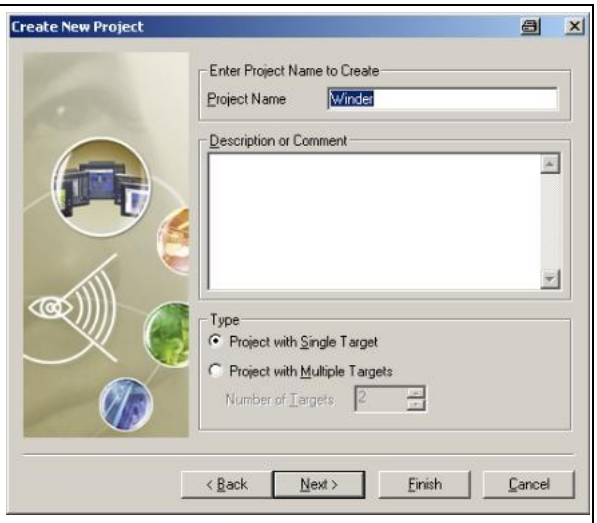
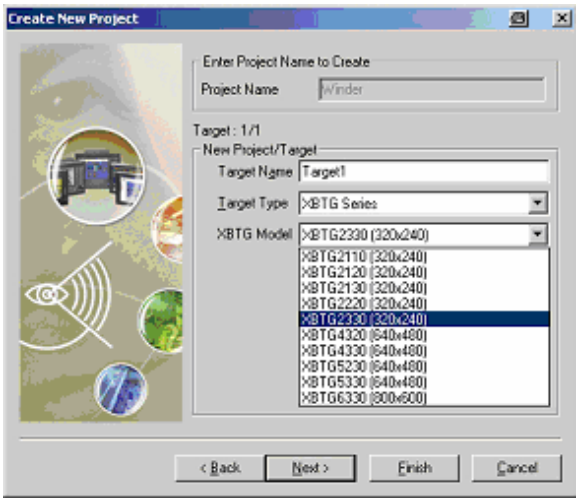
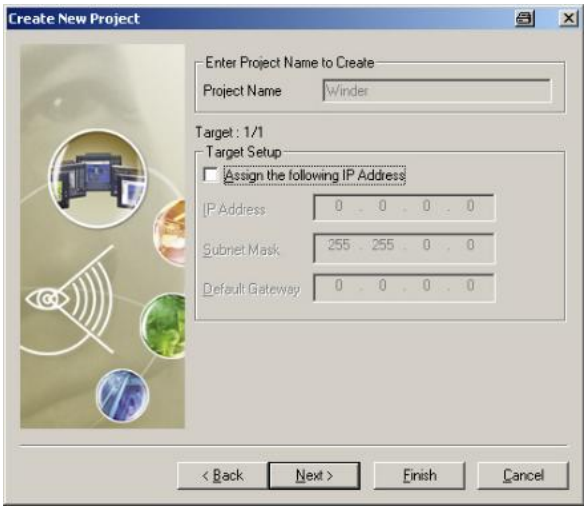
- the tool setup
- Create a new project
- Connect to HMI
- configure the driver
- Link variables
- Create variables
- Examples
- Download the project
- Example application

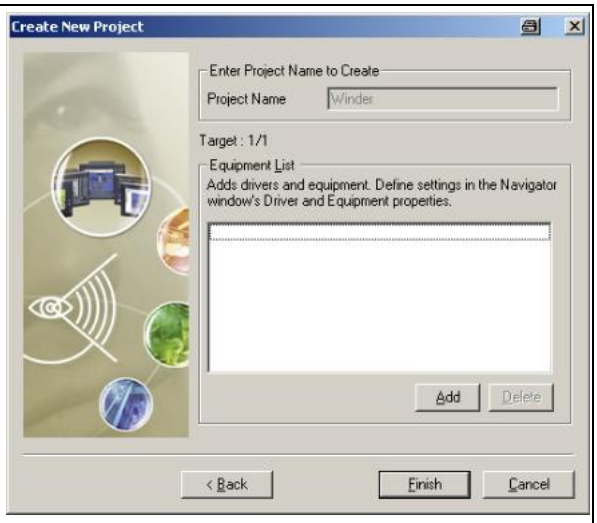
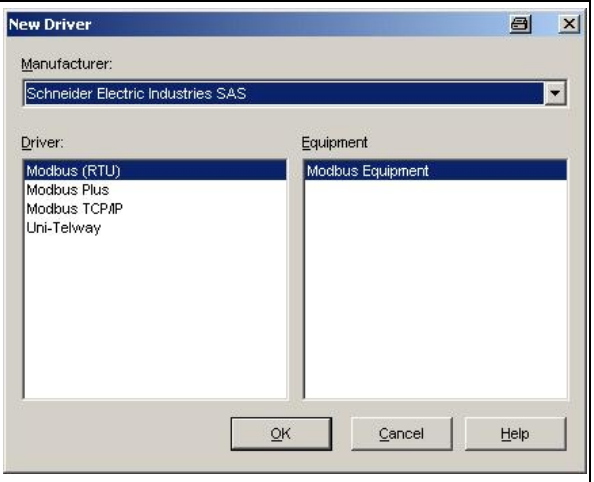
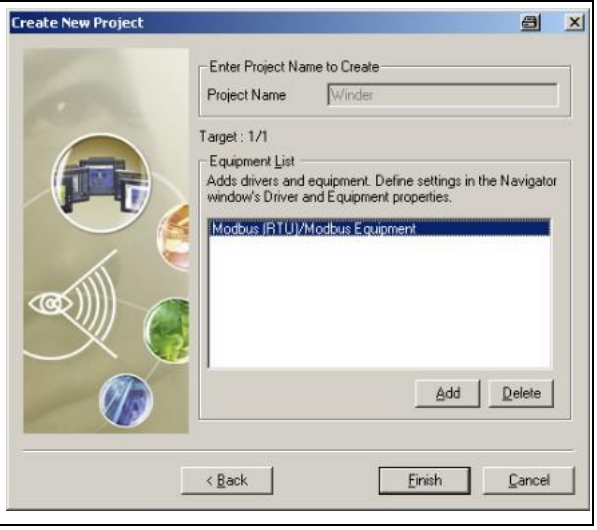
The Tool Setup

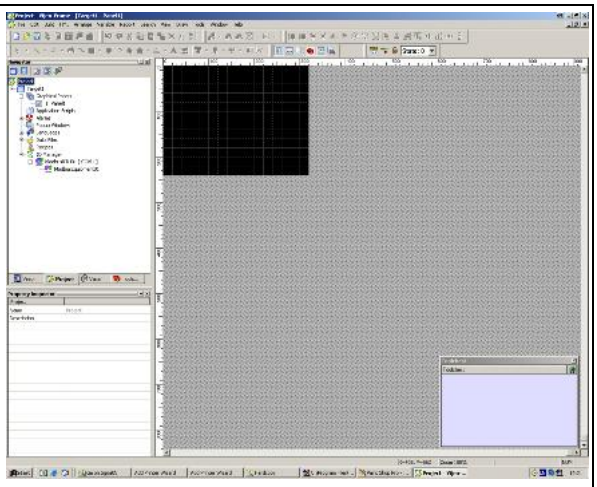
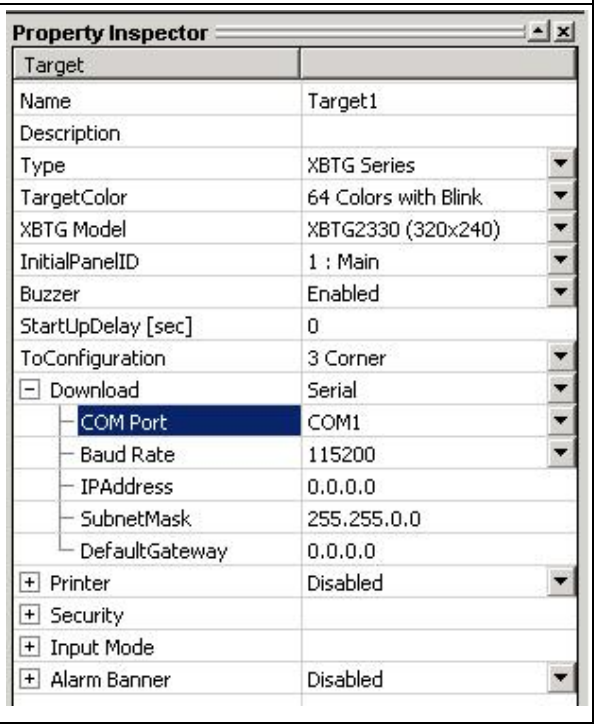
1	Vijeo Designer has the following components: 1 - Navigator 2 - Info-Display 3 - Inspector 4 - Data list 5 - Feedback Zone 6 - Toolbox	

Create a new project

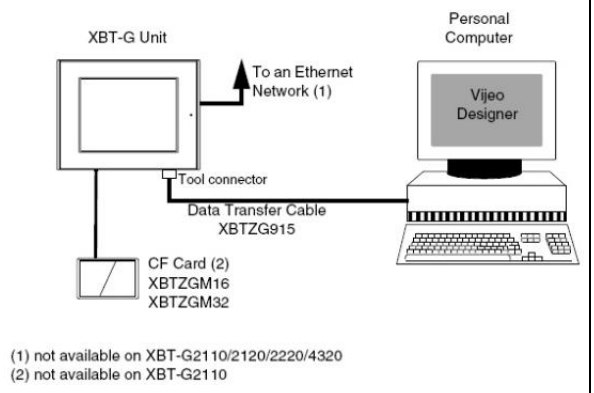
1	After starting Vijeo Designer, select **Create New Project** and press **Next.**	

2	Input a **Project Name** e.g. “Winder” and select: **Project with Single Target** You may enter a **description or comment** but it is not compulsory Press **Next.**	
3	Select the target device **Target Name**: “Target1” **Target Type**: “XBTG Series“ **XBTG Model**: “XBTG2330”	
4	The device has no Ethernet interface, so it requires no IP address. Here simply press **Next** and go to the next dialog.”	

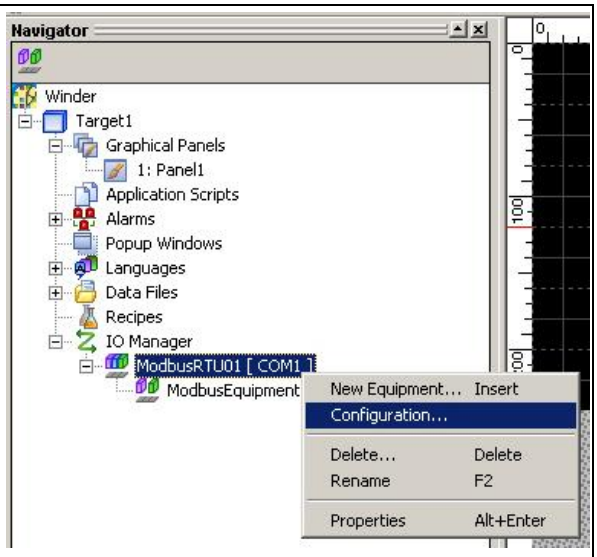
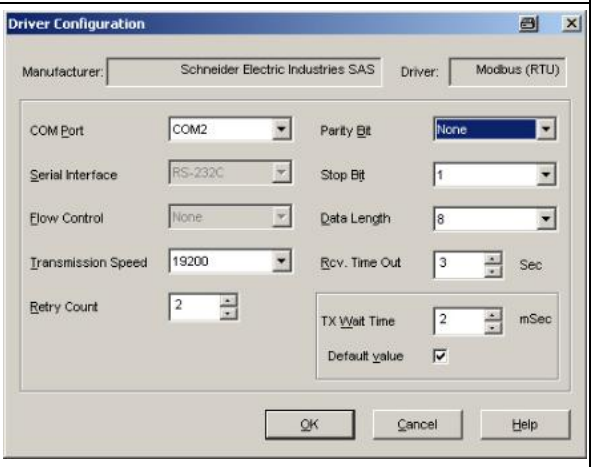
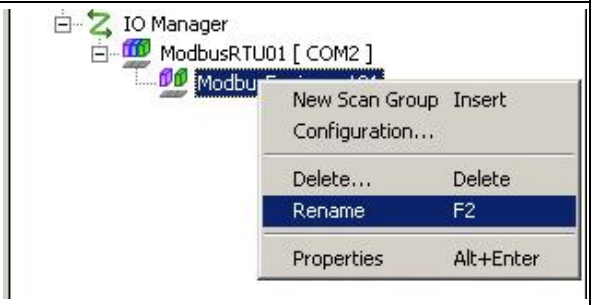
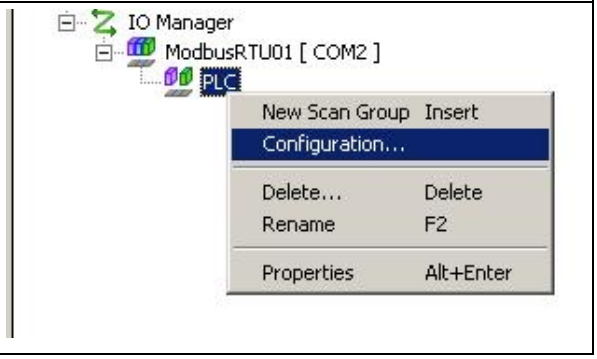
5	The Magelis needs the correct driver to exchange data with the PLC. Use **Add** to go to the driver selection dialog and select a new driver.	
6	In the **New Driver** dialog Select: **Manufacturer**: “Schneider Electric Industries SAS” **Driver**: “Modbus(RTU)” **Equipment**: „Modbus Device” confirm with **OK**.	
7	After setting up the driver you can exit the dialog with **Finish.**	

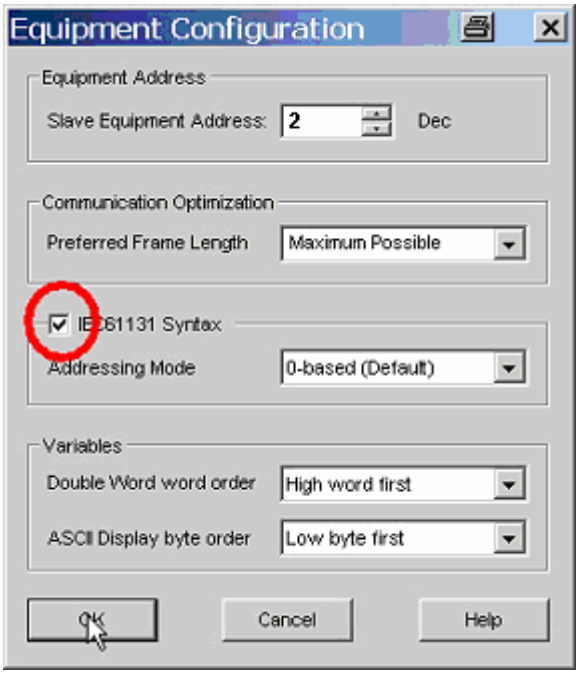
8	Vijeo Designer now returns you to its work top, with an empty display and the project navigator A mouseclick on **Target1** in the navigator brings up the **properties inspector** (or if the properties inspector is closed right mouseclick on **Target1** and selecting **Properties** opens up the **properties inspector)**	
9	Check the properties of the project and in particular the properties of the **COM-port**. It must be set to **serial** for the connection to work properly. Ensure that the COM port settings are correct (normally COM1 as default).	

Connect to HMI

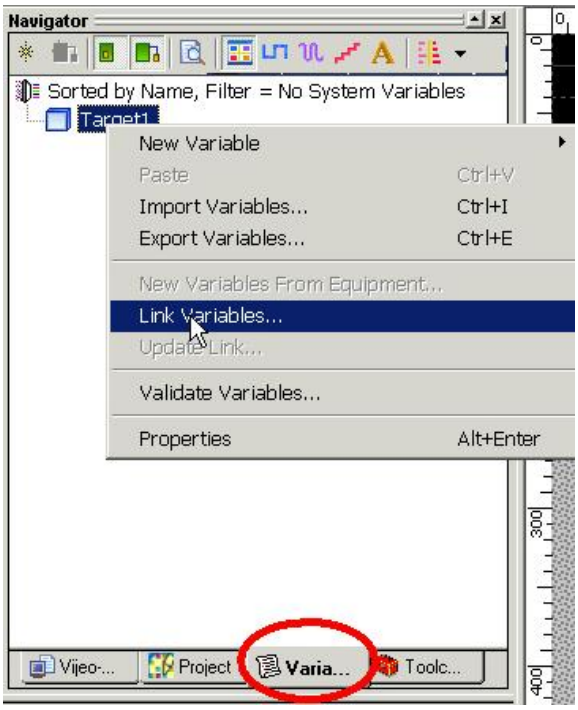
1	Although downloading to the Magelis will not actually be performed now, you must connect the **COM** port of the PC with the **Tool** port on the Magelis to perform the download. Use the cable **XBTZG9156** to make the connection.	

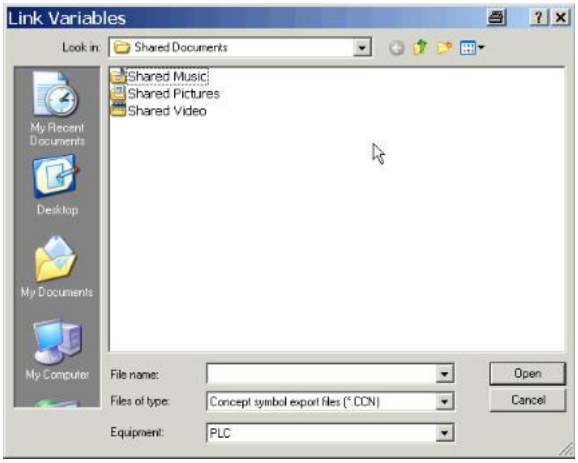
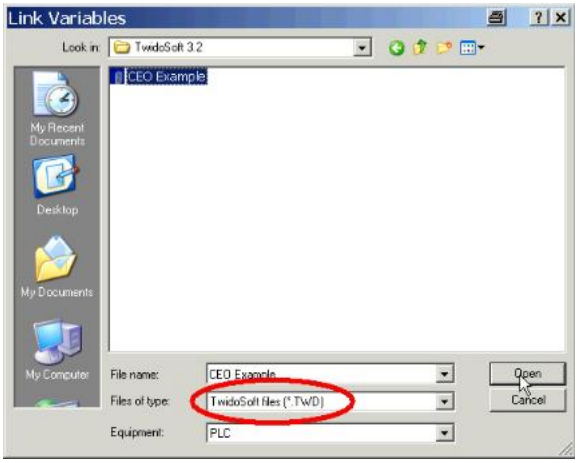
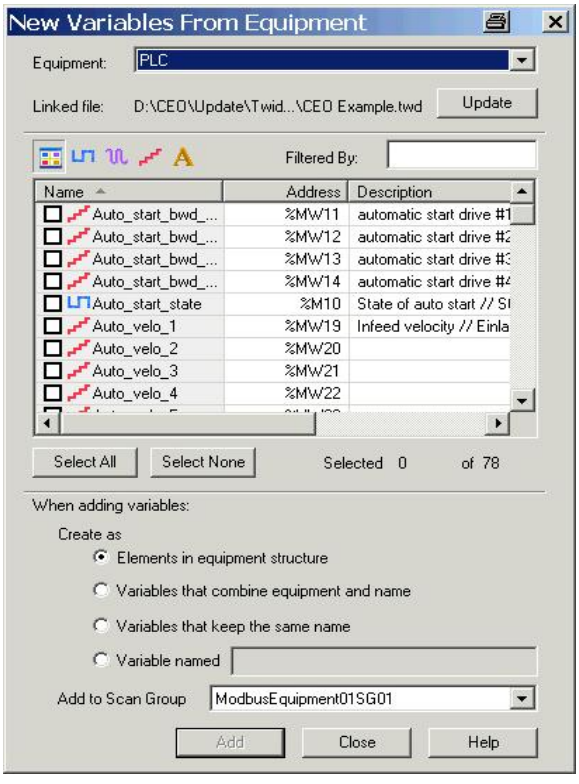
Configure the driver

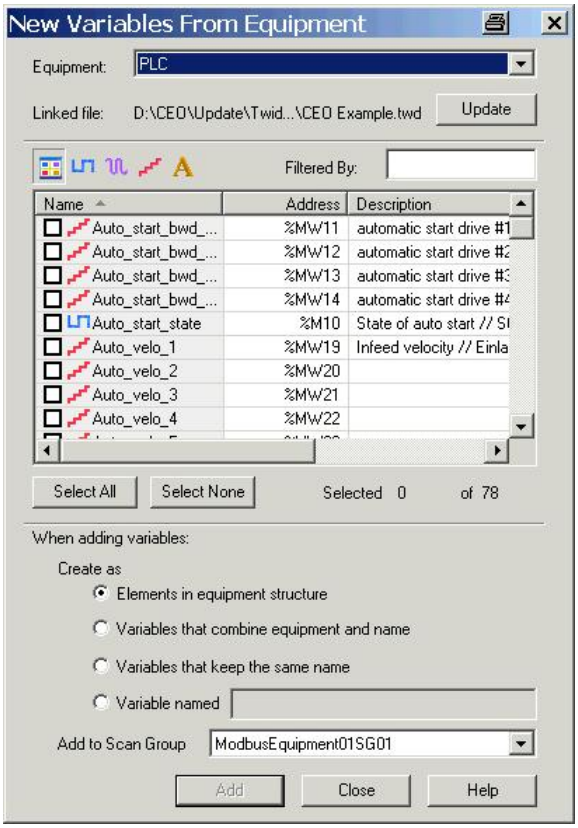
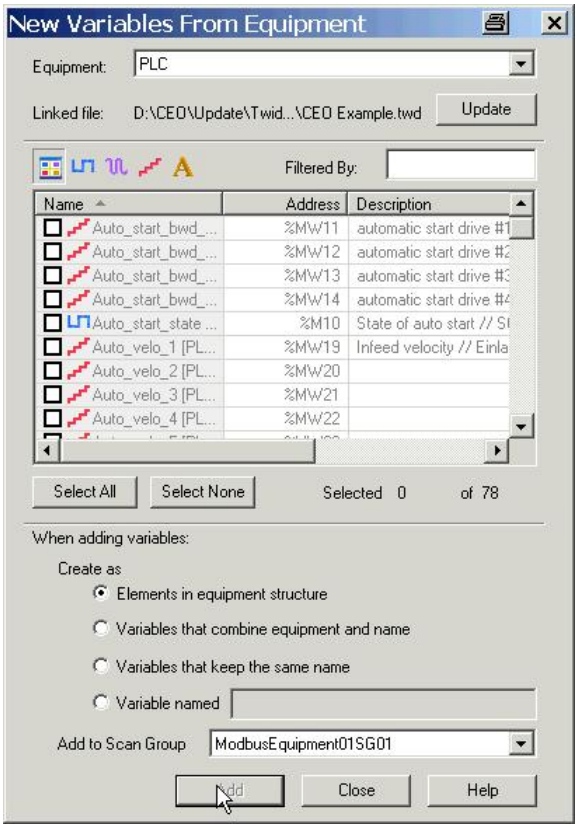
1	For the communications to work you must set up the parameters in the Modbus RTU-Driver For this, right mouseclick on **ModbusRTU01** in the Navigator and select **Configuration...**	
2	In the **Driver Configuration** dialog, input: - **COM2** - **19200 Baud** - **8 Data bits** - **1 Stop bit** - **No Parity** Exit the dialog with **OK.** The configuration must match the port definition on the Twido.	
3	In the Navigator you can rename the configuration to **PLC** with a right mouseclick on the name and selecting **Rename.**	
4	Rightmouse click on **PLC** to go to the device **configuration**. In this configuration the HMI is slave, the PLC is master.	

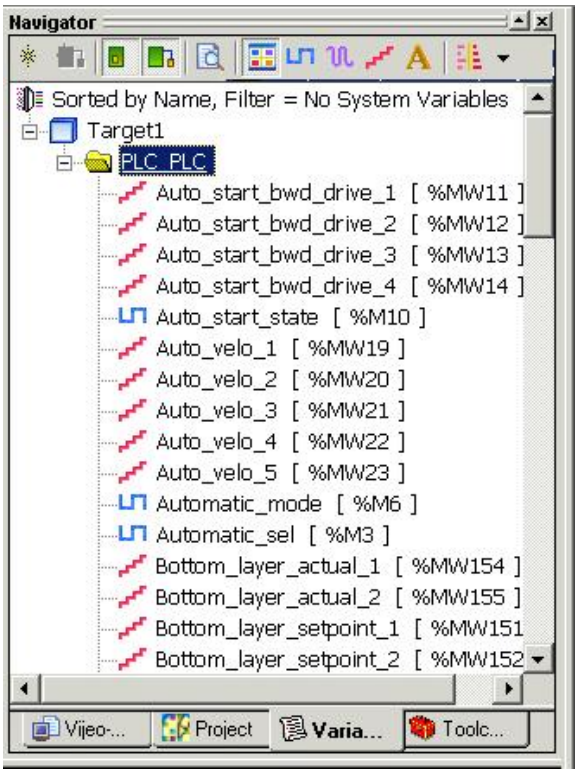
5	In the **Equipment Configuration** dialog set the **Slave Equipment Address** to **2**. and set the checkbox for **IEC61131 Syntax** you can leave the other inputs at their default values. Exit with **OK**.	
6	Acknowledge the confirmation for the **IEC61131 Syntax** with **YES**	

Link Variables

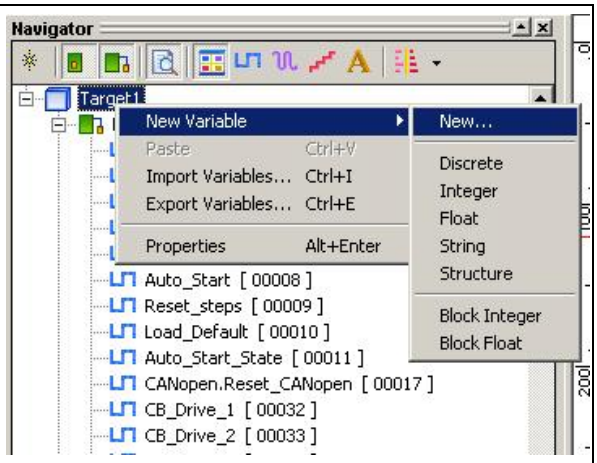
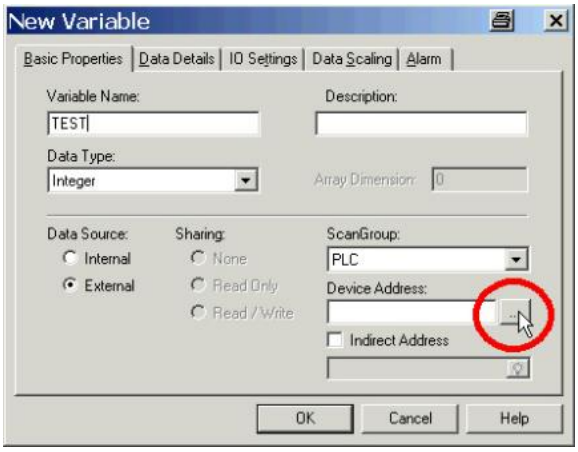
1	As the variables have already been input in TwidoSuite (or some other Schneider product) Vijeo-Designer offers an option to link up to these variables. Select the **Variables** tab in the the **Navigator.** Right mouse click on the project name (here **TARGET1**) and select **Link Variables** in the pop-up menu	

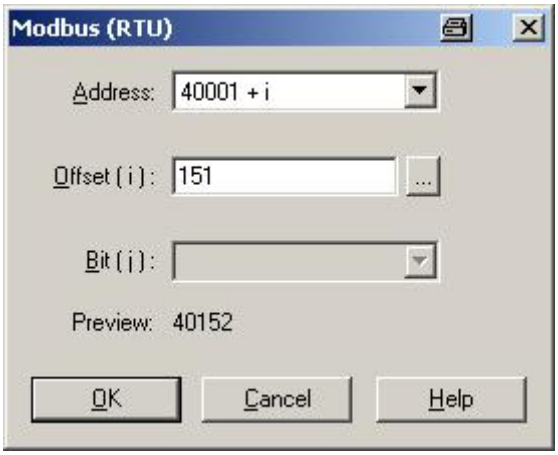
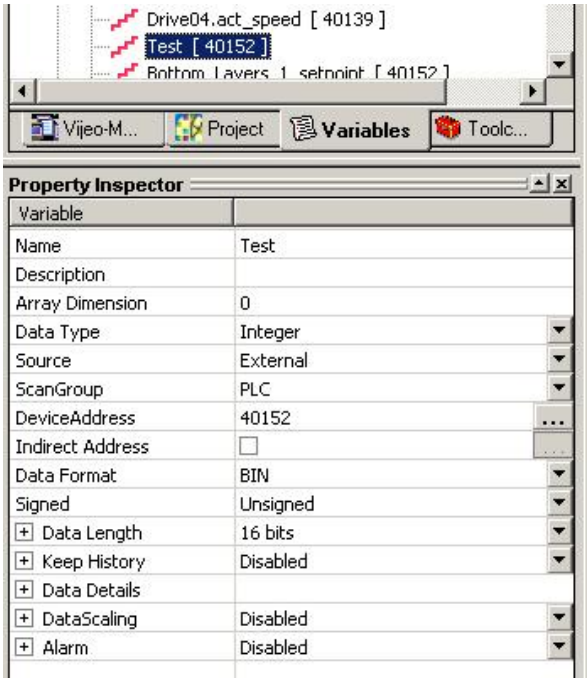
2	In the **Link Variables** window give the path to the file, the type of file and the **Equipment** type (here as named above **PLC**) Select the file and click on **Open**	
3	In this example the path was set to the TwidoSoft directory, the file type set to TwidoSoft and the equipment set to PLC. Then a Twido file (*.twd) was selected and opened.	
4	Once the file was successfully opened you will be offered a selection list of the available variables	

5	Mark the variables you wish to link to and click on **Add.**	
6	Linked variables are now de-activated with grey text. If you have finished linking the variables you require, exit the dialog with a click on **Close**.	

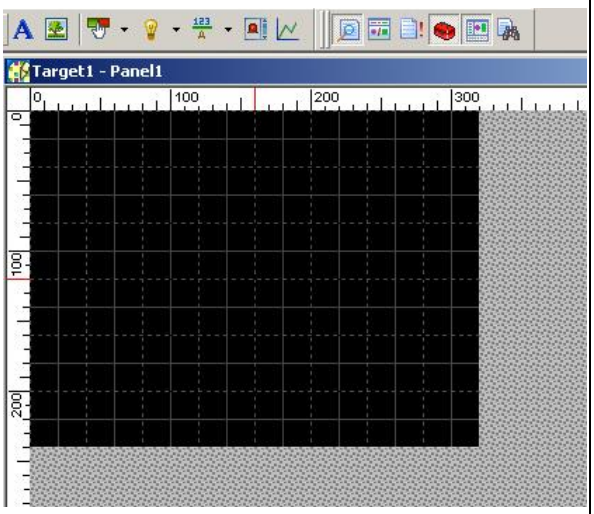
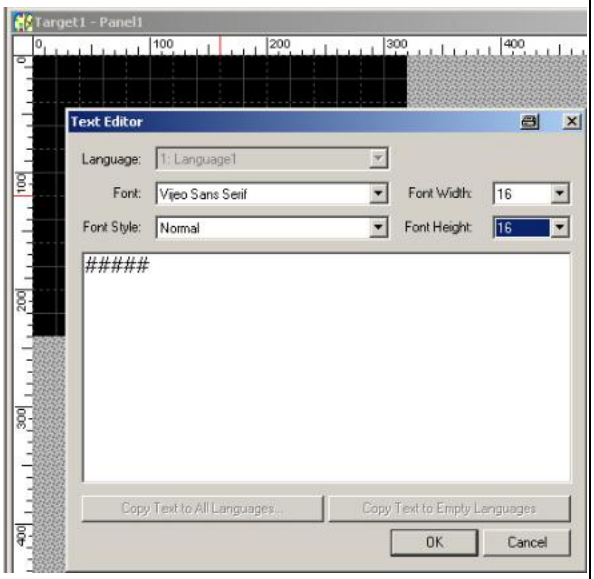
7	All variables can now be viewed in the navigator on the **Variables** tab.	

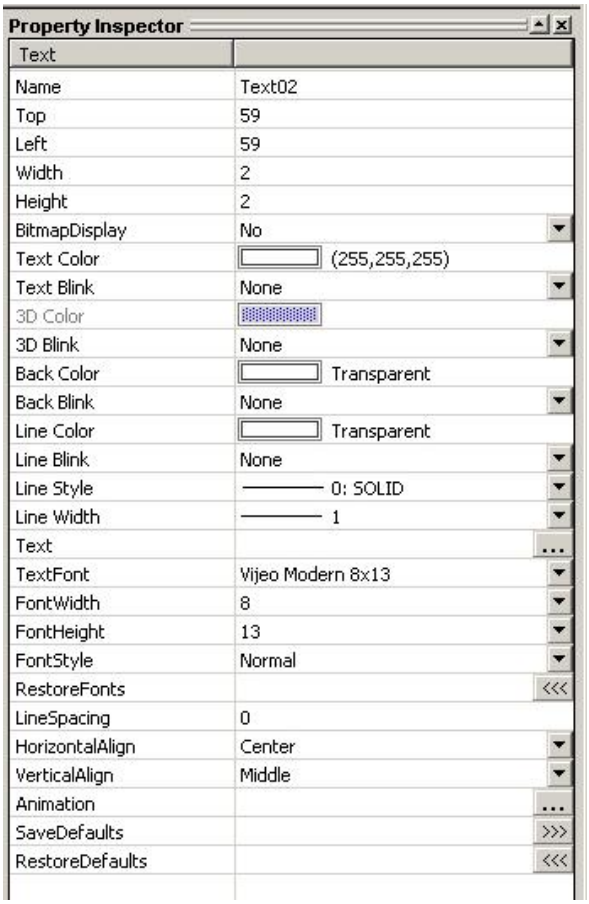
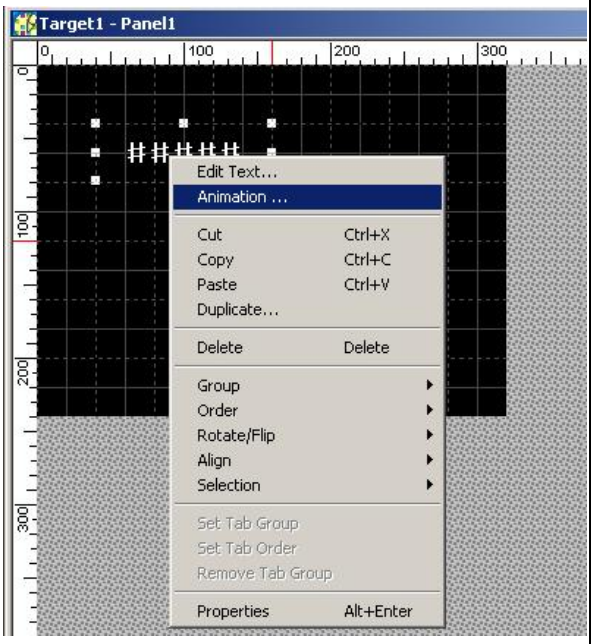
Create variables

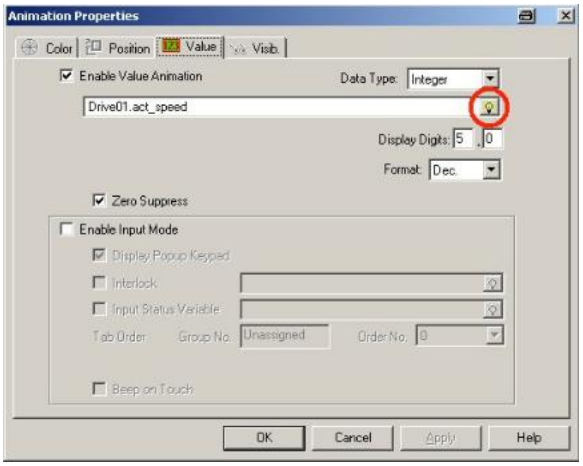
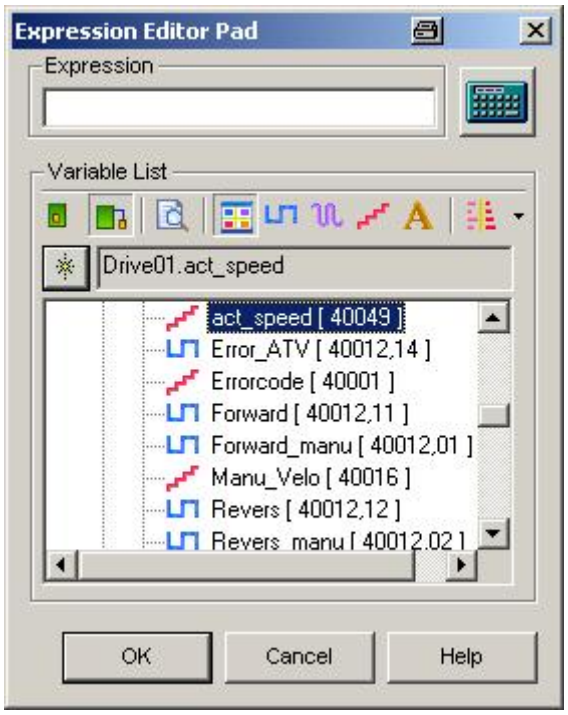
1	To create variables, click on the Tab **variable** in the **navigator** A right mouse click on **Target1** opens up the pop-up menu to go to **New Variable -> New…** and the variable definition dialog.	
2	To create a variable you must input a: • Variable name • Data type • Data Source (External) • Address in the PLC **Device Address**: Here you can address bits (%M..), memory words (%MW..) in the PLC.	

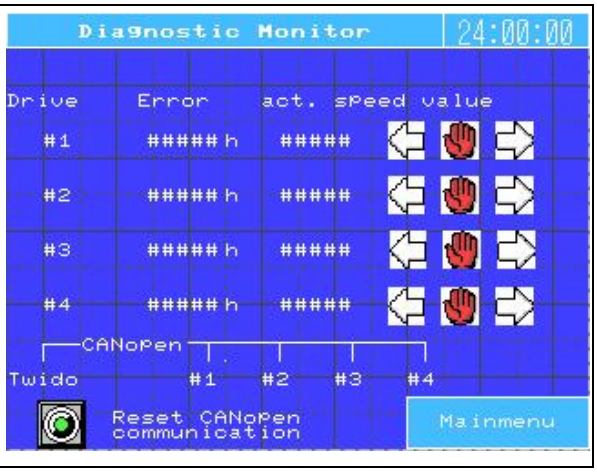
3	clicking on the **Device Address** opens up a dialog for the input of the address. PLC internal formats such as counters muss first be transferred to memory words before the Magelis can display them. Integers and Reals : 30001 + i and 40001 + I Discretes: 00001 + i and 10001 + i and 30001 + i, j and 40001 + i, j where „i“ represents the bit number or word number i.e. you address them with the appropriate offset.	
4	Examples: PLC %M106 HMI 00001 + 106 => 00107 PLC %MW207 HMI 40001 + 207 => 40208 PLC %MW100 Bit5 HMI 40001 + 100, 5 ⇨ 40101,05 The image shows the variable **Test** with its attributes listed in the **Property Inspector.**	

Examples

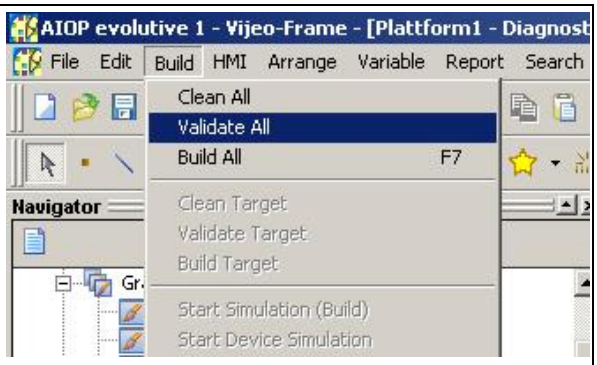
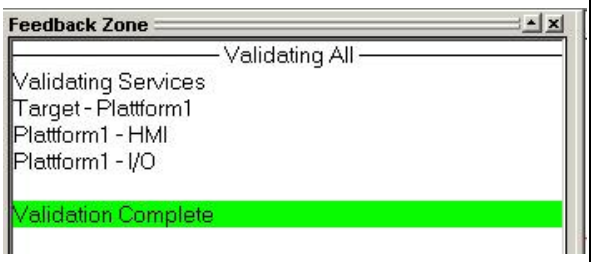
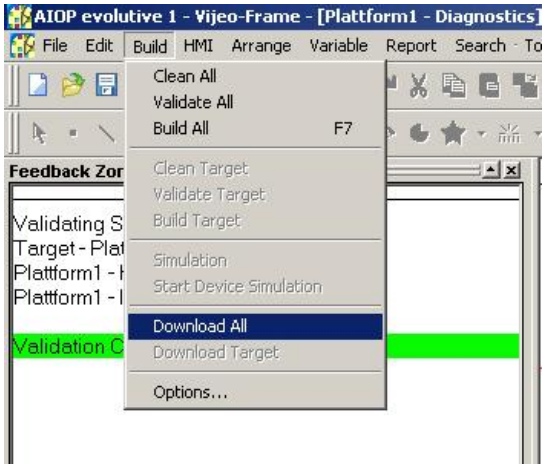
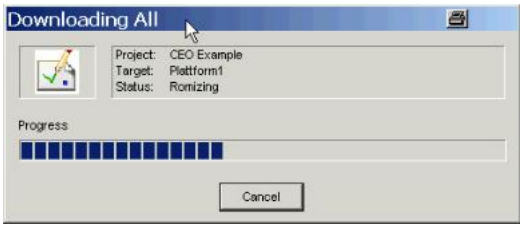
1	**Example: Insert Text** Select the text tool in the tool bar. The toolbar displays the toolbox with tools for editing the display.	
2	**Example: Create Text** With the text tool, position the text box on the display. You can adjust its size by „pulling“ on the box or by giving a value in the **text editor dialog**. Double click on the text box to open up the **text editor dialog** you can input the text to be displayed and define its size, font, etc.	

3	After inputting the text you can define/change the text characteristics in the **Property Inspector**	
4	A right mouse click on the text object in the display leads to the **animation**. This is the same animation as seen in the property inspector (see image above) but in another format. Both formats contain the same attributes.	

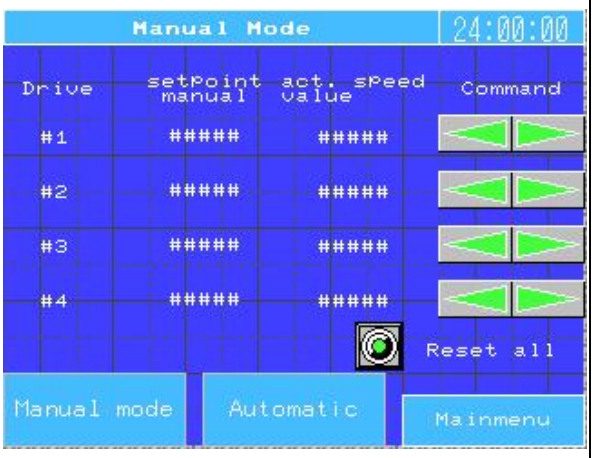
5	**Animation Properties:** • Colour • Position • Value • Visibility For the variable used to animate this object, you can either manually input the variable or click on the lightbulb icon to browse the variable list and select a variable. If you input an unknown variable it is shown in red – the variable has yet to be defined Once activated variables can be selected and their display format defined. If the value requires further processing before use, such as trigonomic functions, you can select these via the calculator icon.	 
6	Text and Graphics examples.	

7	This picture shows the finished diagnostic screen with some animations and buttons	

Download the project

1	Before you download the project to the Magelis you must validate it With **Validate All** you can analyse your project. The **feedback zone** shows you the results of the analysis. You can invoke the project analysis using **Build All** too.	 
2	**Downloading the project to the Magelis (HMI)** Select the project in the **Navigator**. Use **Build->Download All** to transfer the project to the HMI device. The transfer is done using the configured protocol (serial in this case). The Vijeo Designer package contains a **serial** cable as standard. The download process is indicated with a progress bar.	 

Example Application

1	The example application contains several user screens. The picture shows the main screen which, on clicking on the buttons, leads to further screens. This screen shows the language selection and drive mode etc.	
2	To test individual drives click on **Manual Mode** in the above screen. In the screen that pops up click on the input fields in the columns **Set Point Manual** and input a value von 0..1500 (corresponds to 0..50Hz). Now select **Manual Mode** and hold down one of the green arrows to the right of a drive number. The drive starts up in the direction selected and the actual speed value is displayed. Releasing the button locks the drive again.	

PLC

Introduction

The PLC chapter describes the steps required for the initialisation, configuration and the source program required to fulfil the functions.

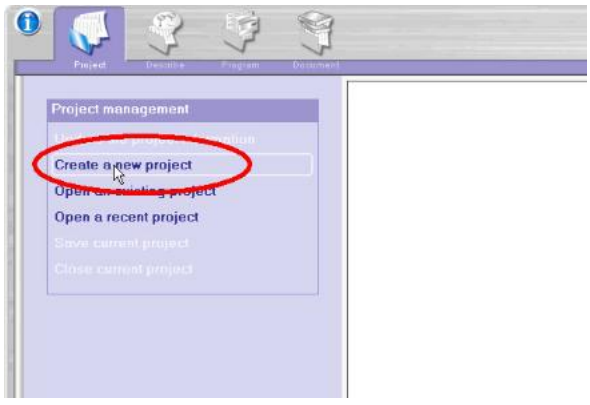
The application program is produced using Twidosuite.

Preconditions

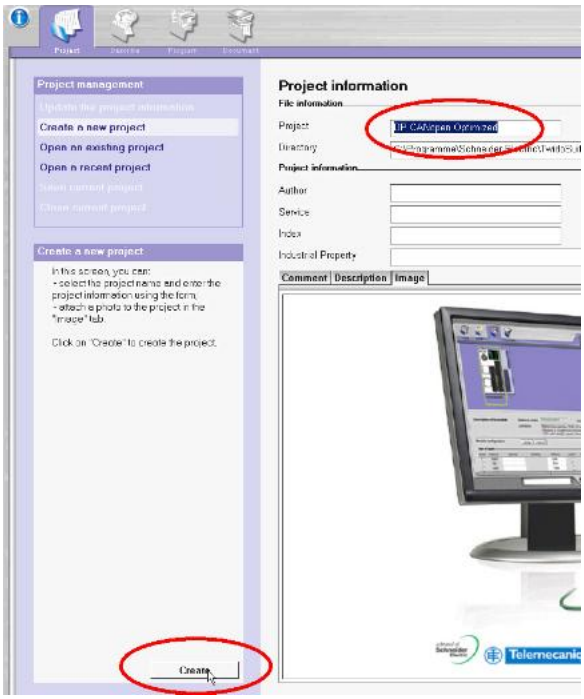
In order to proceed you require the following:

- Twidosuite installed on your PC
- The Twidosuite example project
- The Twido PLC is connected to a power supply and switched on
- The PLC is connected to the PC with the programming cable (TSXPCX1031)

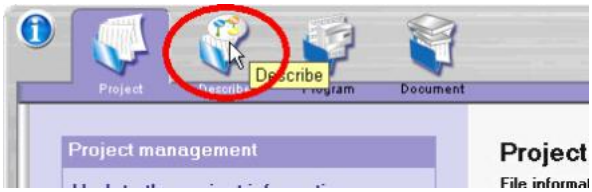
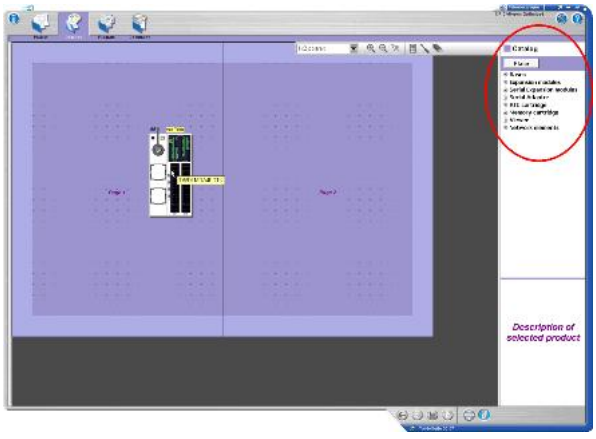
Starting Twidosuite

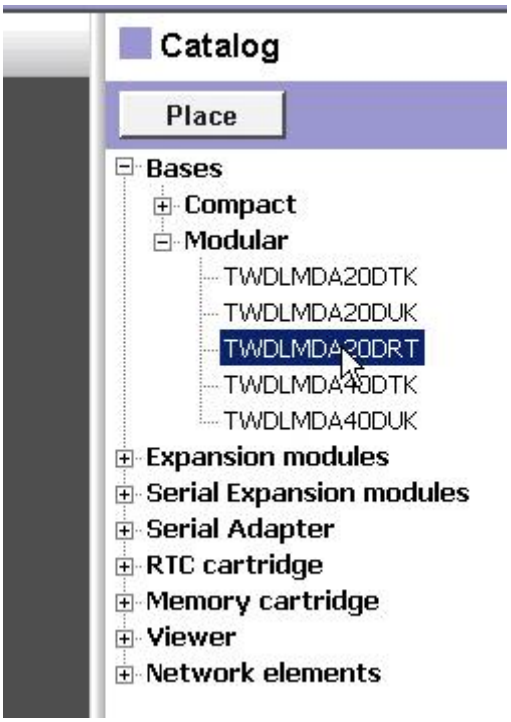
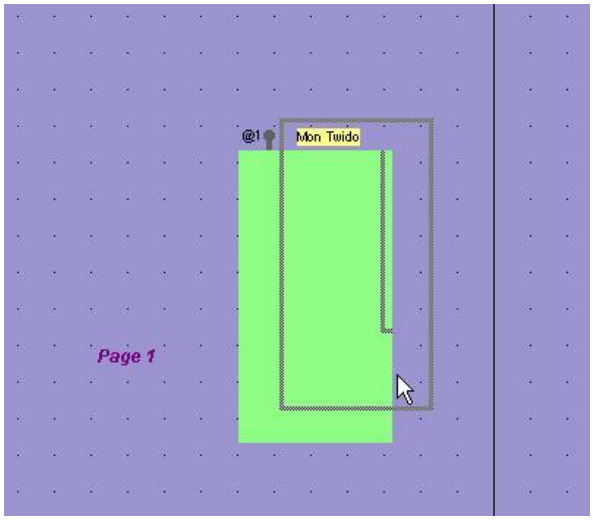
1	To start work with Twidosuite, click on: **Programming Mode** Use the language selection buttons to set the language for this session.	
2	The start up screen for the main menu is displayed. With **Create a new project** you can start a new project.	

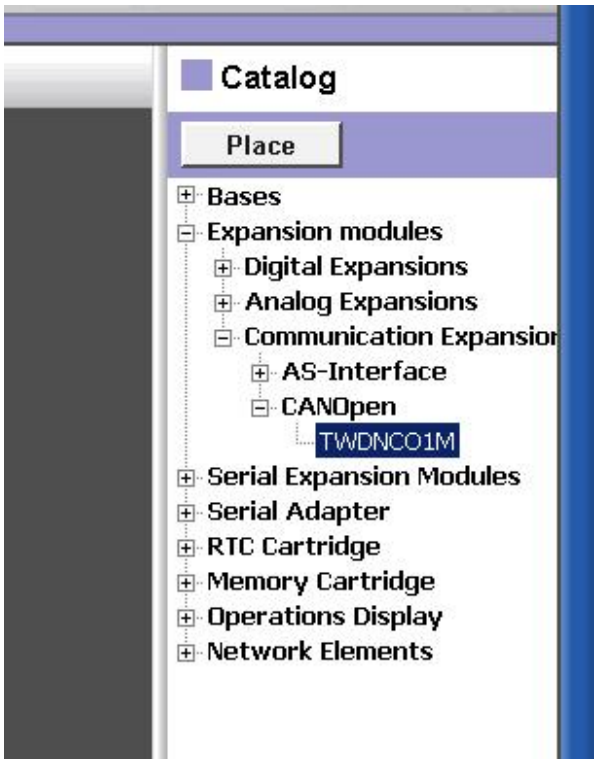
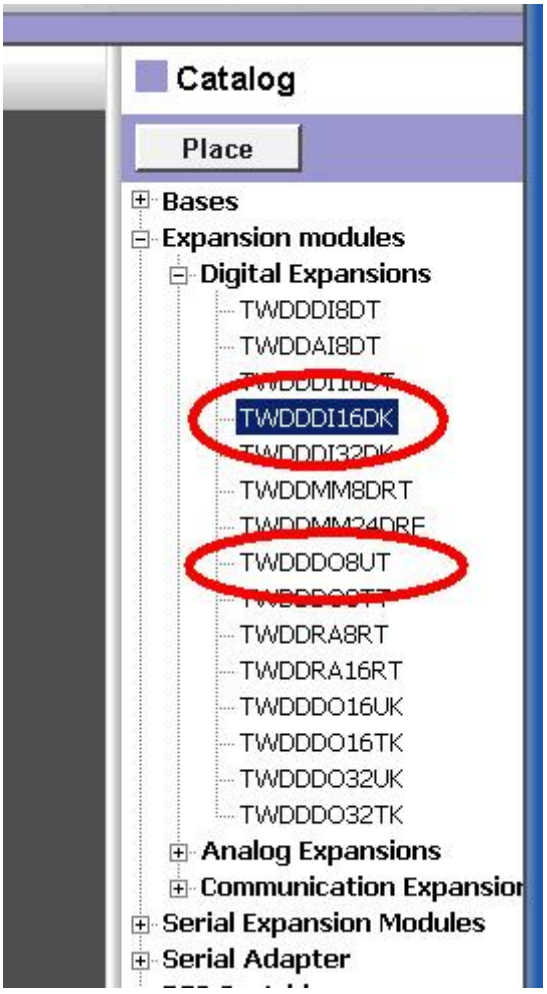
Create a new Project

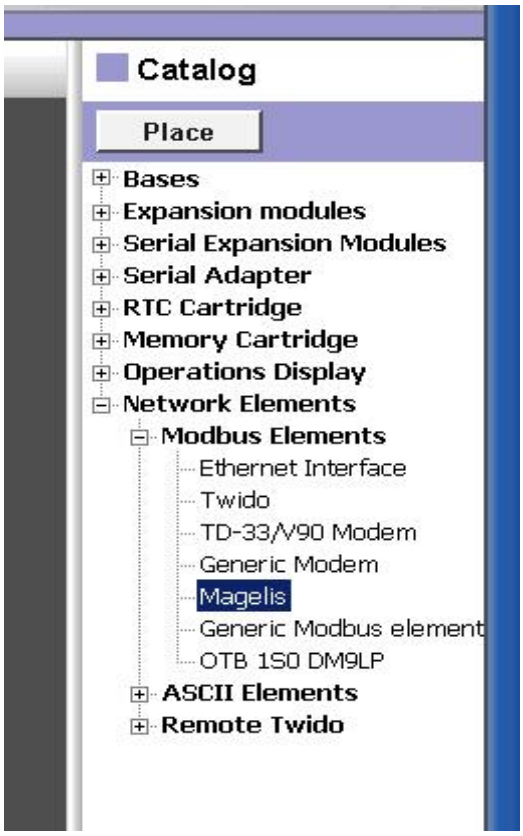
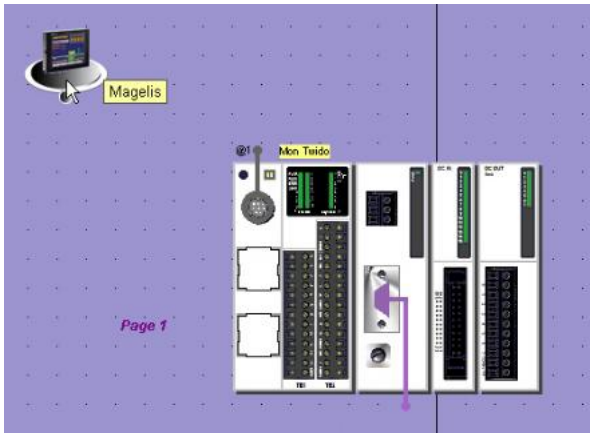
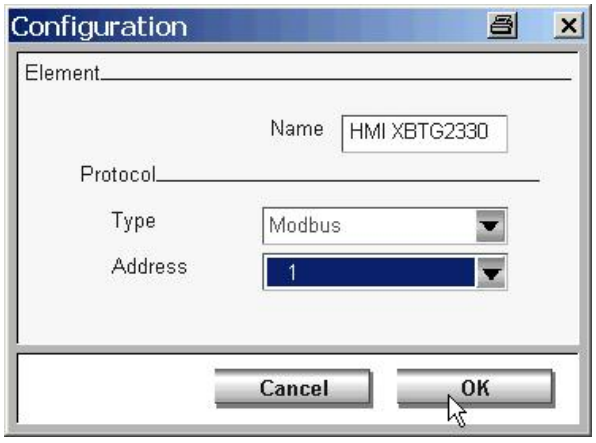
1	Once **Create a new Project** is selected, enter a **Project** name and select the **Directory** path to save it. You can enter **Project Information** if required but it is not mandatory. Confirm with **Create**.	

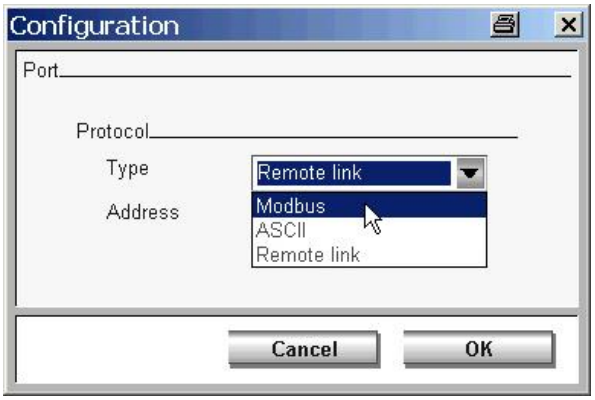
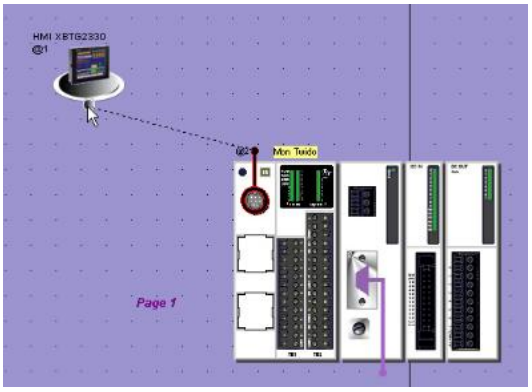
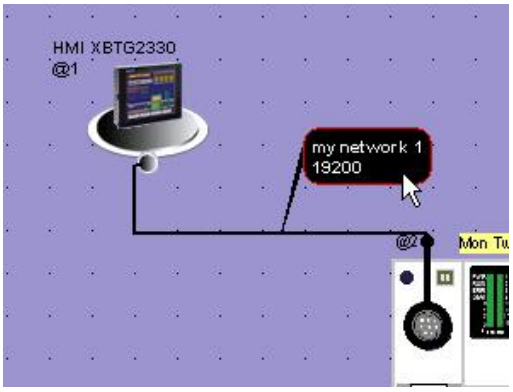
Select the Hardware

1	Now go to **Describe** to configure the hardware.	
2	In the configuration Workspace you will see a Twido PLC. In the **Catalog** on the RHS you can select the hardware/modules you wish to configure The Workspace offers you graphical documentation.	

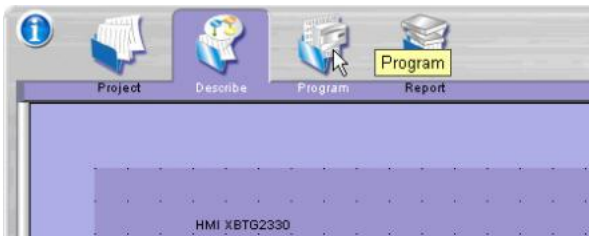
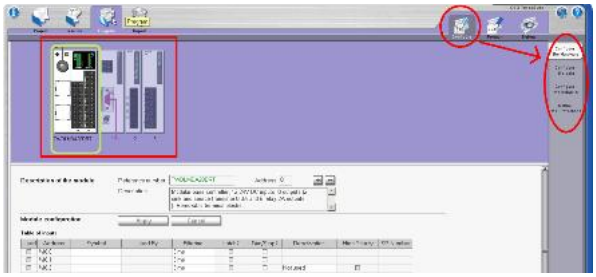
3	In the **Catalog**, first select the correct type of Twido **TWDLMDA20DRT**.	
4	Use Drag&Drop to drag the selection to the graphical image of the Twido. The grahical image will change to green. Drop the selected Twido while the mouse icon is in the green field.	

5	As next modules select the CANopen Master **TWDNCO1M**. Use Drag&Drop to place it to the right of the Twido PLC in the graphical image.	
6	Now add the extra digital inputs module **TWDDDI16DK** Again, using drag&drop place it next to the CANopen Master. Finally add the digital outputs module **TWDDDO8UT**.	

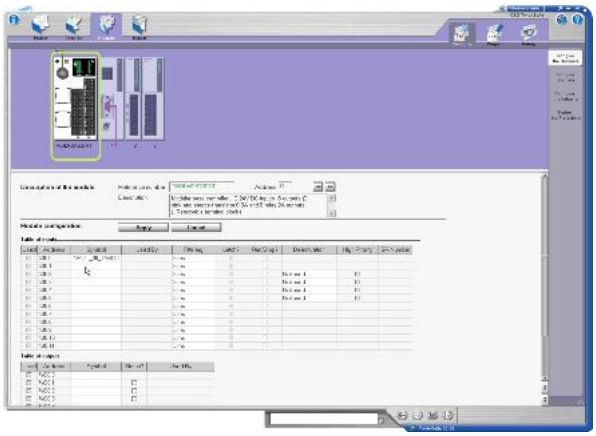
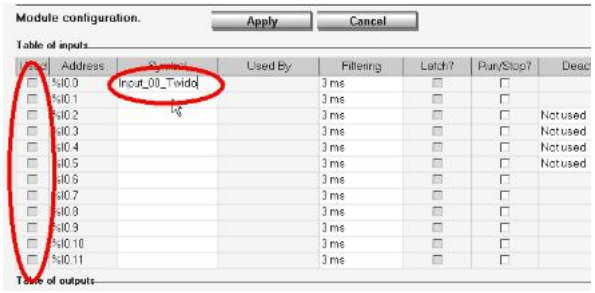
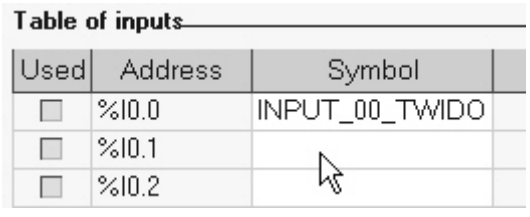
7	Now add the Magelis Terminal **XBTG2330** For this add the general Magelis **Modbus element** to the configuration.	
8	The Workspace now shows a graphic display of the configured modules/devices. The connection HMI/PLC, via the Modbus interface, has still to be done.	
9	To confgure the HMI connection, move the mouse icon over the HMI until the mouse icon changes to a **screwdriver**. Now a doubleclick opens up the **configuration** dialog. Give the device a **Name** and check that the default **Protocol Modbus** at **Address 1** is offered. Confirm with **OK**.	

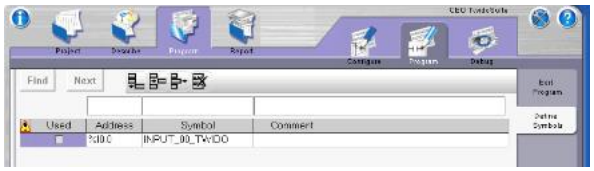
10	Name and Modbus address now appear in the graphic display next to the HMI device.	
11	Now do the same for the PLC modbus interface. Position the mouse icon on the modbus interface of the PLC. When the mouse icon changes to a screwdriver, doubleclick to open up the config-uration dialog. Change the **Protocol type** to **Modbus** and set the **Address** to **2**. Confirm with **OK**.	
12	Now connect the two devices in the graphics display by linking the white crosses that reperesent the linking points. To do this click on the white cross of one device and then the next so that the link is displayed.	
13	After linking the devices you can give the network a name and set the baud rate by double clicking on the connecting line or the network box. In this case we use the default values.	

Hardware Configuration

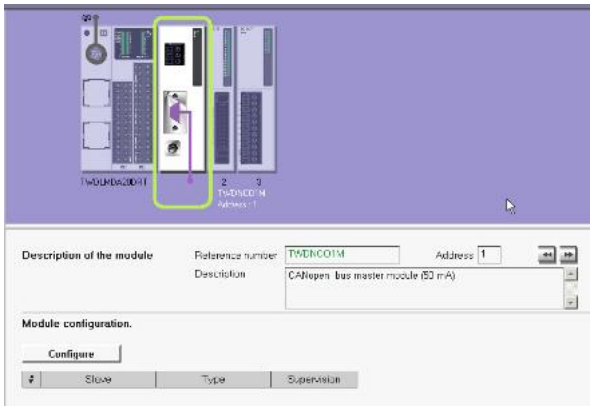
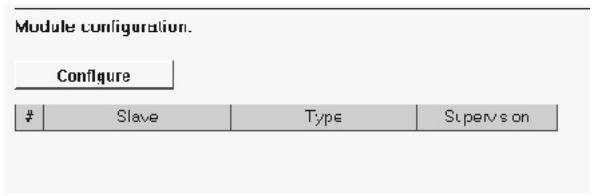
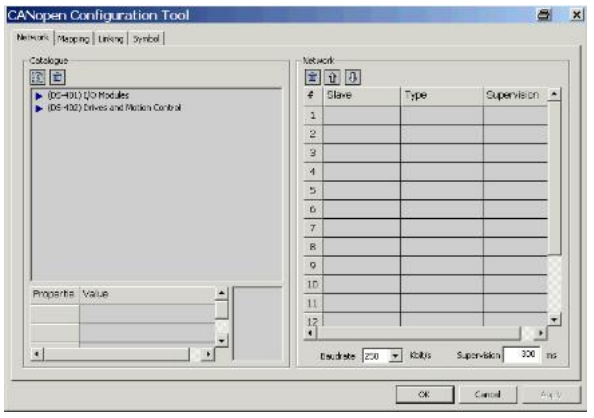
1	For the hardware configuration select the main menu **Program**.	
2	The screen shows the PLC rack. Note the menus on the RHS and bottom of the display area. Menus on the RHS are sub-menus to the main menu along the top.	

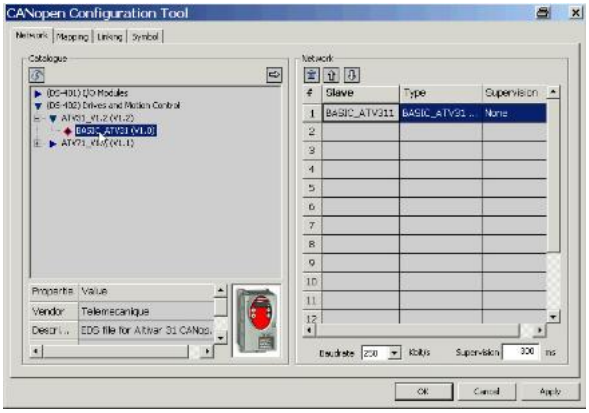
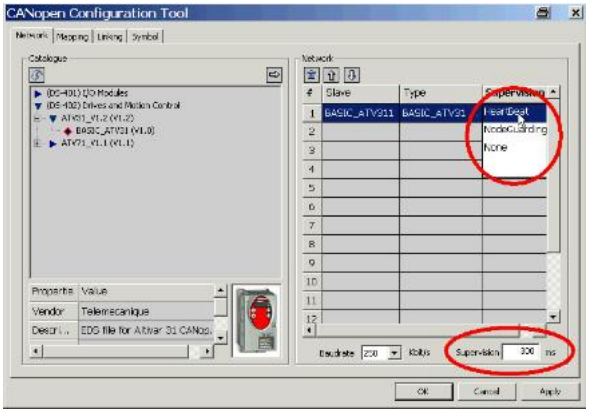
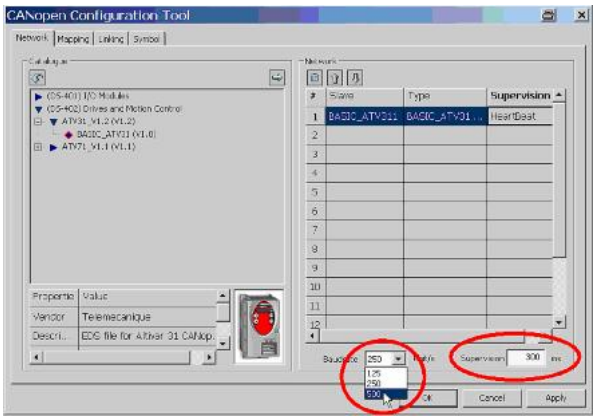
Twido SPS

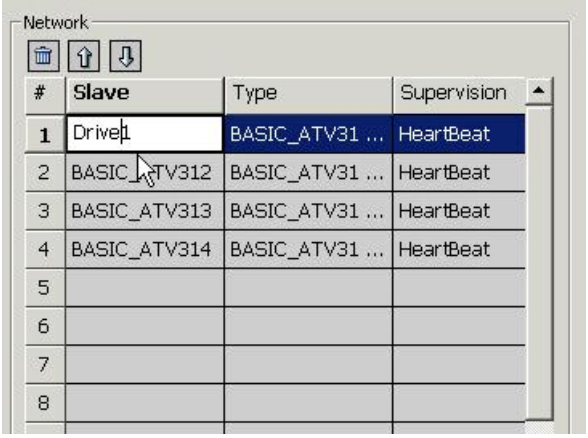
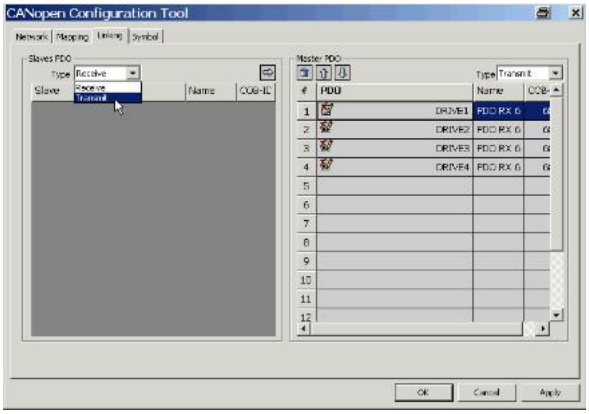
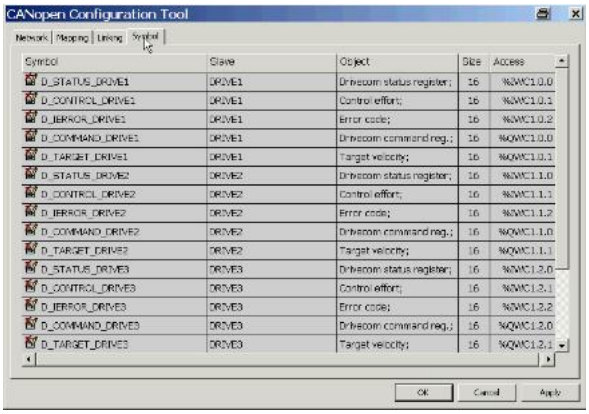
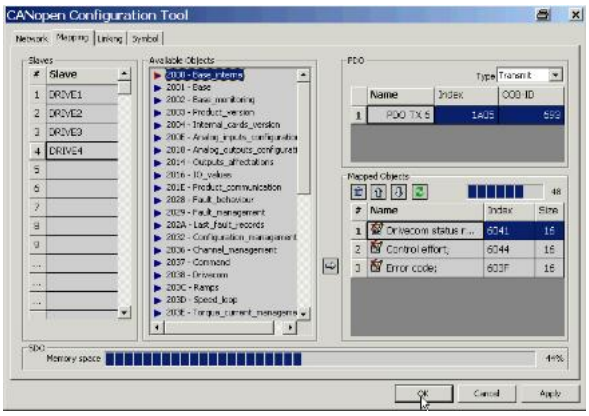
1	You can now configure all the I/O variables for the PLC. To name the variables click on the **Symbol** column for a particular I/O and input the new name.	
2	Spaces and special characters are not allowed in symbol names. If the variable is already in use in the program, the check box to the LHS is activated.	
3	All symbol names are shown in uppercase.	

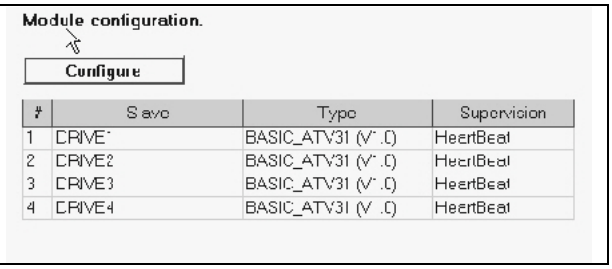
4	Changes are only made when the **Apply** button is pressed. If you try to exit the dialog without pressing **Apply**, you will be reminded.	
5	Symbols entered in the configuration are automatically inserted into the variable list.	

CANopen Master

1	The next step is to configure the CANopen Master. Click on the CANopen module in the graphics image.	
2	Click on **Configure** in the **module configuration**.	
3	The **CANopen Configuration Tool** appears.	

4	In the Tab **Network,** double click on **BASIC ATV31(V1.0)** in the **Catalogue** to add an entry in the **Slave** list of the **Network**. Add another **Slave** with each double click. The row number(#) in the **Network** list is used as the CANopen Address. Use the cursor keys to move slaves up or down in the list.	
5	Default entry for a slave is **Supervision** : None The default timeout for all slaves is **300**msec. Set the supersvision to **HeartBeat** but leave the timeout at the default.	
6	The default baud rate is **250** Kbit/s. For the example project, set it to **500** Kbit/s.	

7	Once you have entered all 4 drives in the slave list you can rename them e.g. Drive_1 … Drive_4 . To aid fault diagnosis, the entries are made so that Drive_1 is Slave 1, Drive 2 is Slave 2 etc.	
8	The tab **Linking** lists the PDOs for the individual devices. This tab is for information only. You need to make no changes here	
9	The **Symbol** tab lists all configured I/O Variables and their symbolic names. Die Variables for the Altivar31 are listed with standard names. These names can be changed if required.	
10	To save the configuration click on **Apply.** Close the dialog with **OK**.	

11	Back in TwidoSuite, the configured Slaves are now listed in the entry for the CANopen Master.	

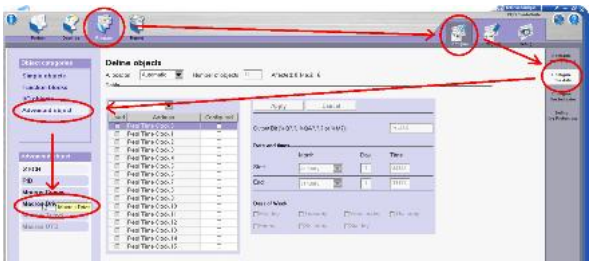
Digital Input-Modul

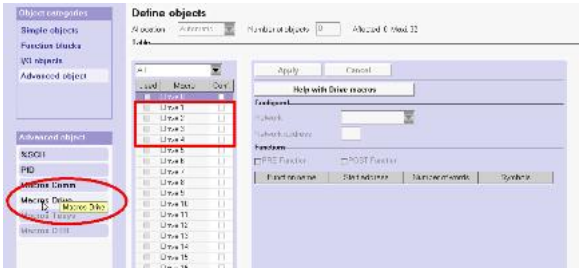
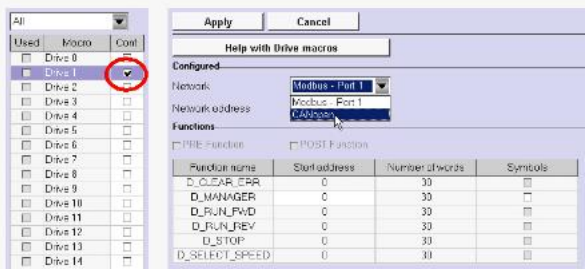
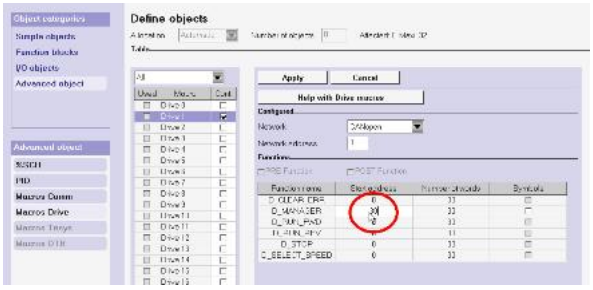
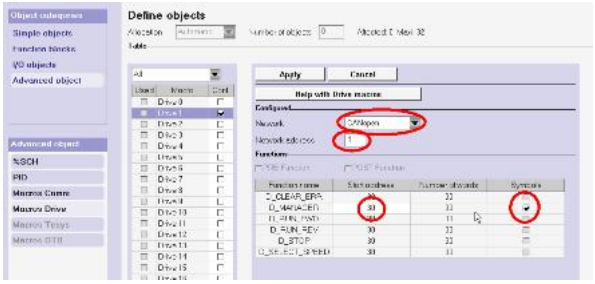
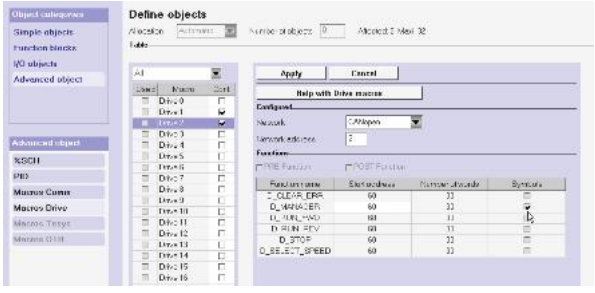
1	click on the the digital input module in the graphic. The list of Inputs appears for the module. Symbol names can be input and applied. The variables are automatically inserted into the variable list	

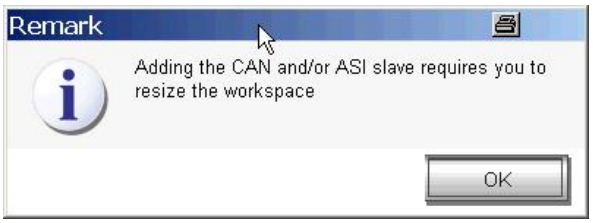
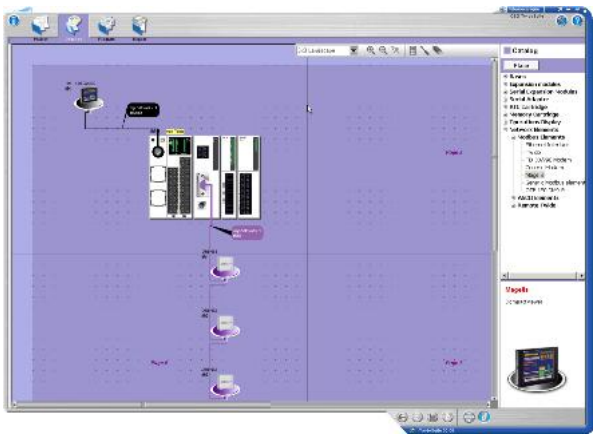
Digital Output-Modul

1	click on the the digital output module in the graphic. The list of outputs appears for the module. Symbol names can be input and applied. The variables are automatically inserted into the variable list	

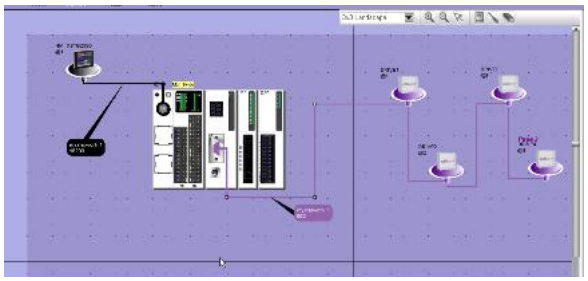
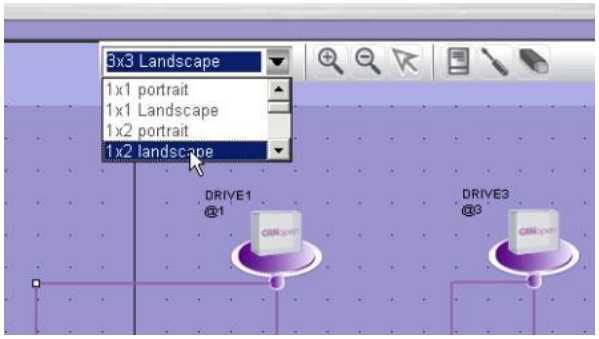
Drive Macros

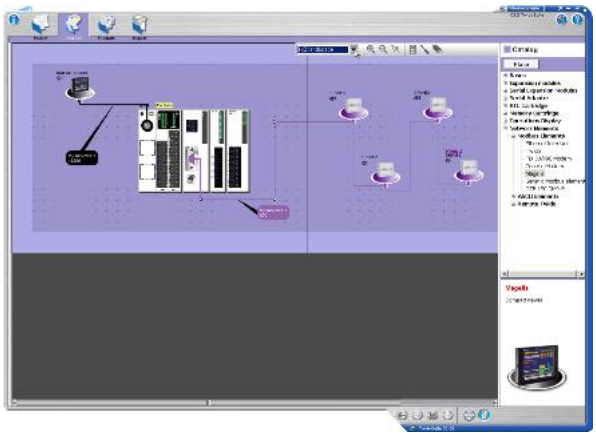
1	To use the TwidoSuite macros for the Altivar 31, they must first be configured. To do this select: **Program->** **Configure->** **Configure the Data->** **Advanced object->** **Macros drive**	

2	For legibility, the macros are given the same number as the slave addresses, i.e. 1 – 4.	
3	Select a macro to configure it by activating the check box. Set: **Network**: CANopen **Network Address** : 1	
4	Reserve the memory words for the function in the entry **D_Manager**. In the example 30 words are reserved for macro drive 1, from MW30 to MW59, by giving the **Start address** and the **number of words** required	
5	Setting the check box in the **Symbols** column allows the variables to be included in the variable list.	
6	Click **Apply** to implement the drive configuration. In the example drives 1-4 are set up with MW30, MW60, MW90 and MW120	

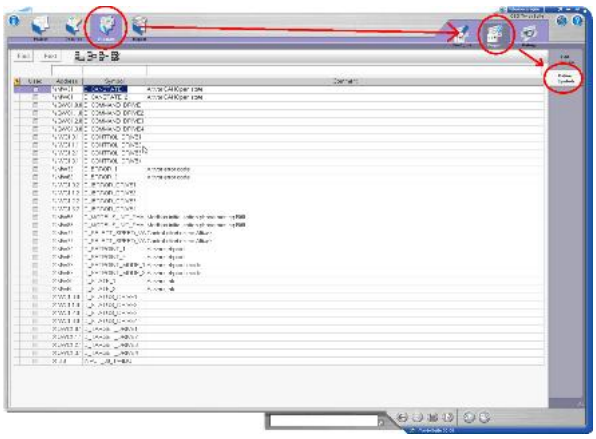
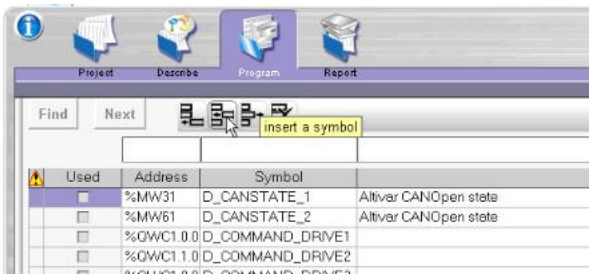
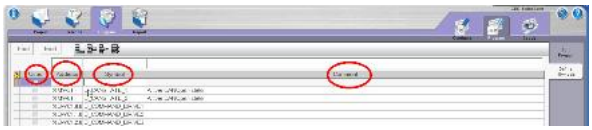
7	Change now to the main menu **Describe** and you will receive a request to resize the workspace. Acknowledge the message with **OK**.	
8	TwidoSuite has increased the workspace and the configured drives and CANopen bus are now shown in the graphics.	

Resizing Workspace

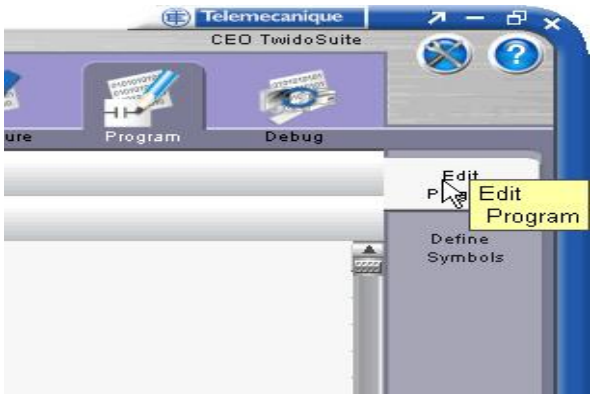
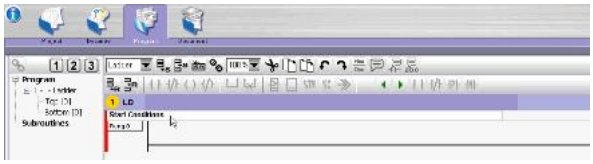
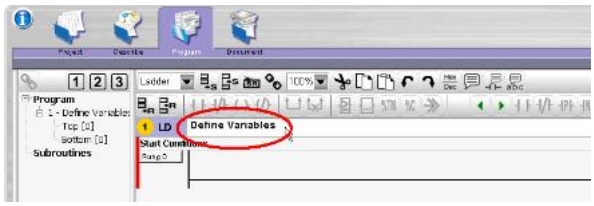
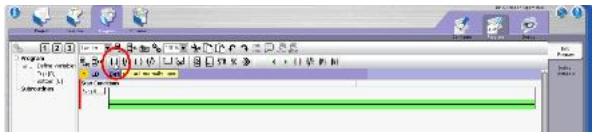
1	You can re-position objects in the graphic to save space and for better legibility. Note: if you now print the image for documentation purposes empty fields are printed too.	
2	To delete the empty fields, change the workspace format from 3x3 to 1x2.	

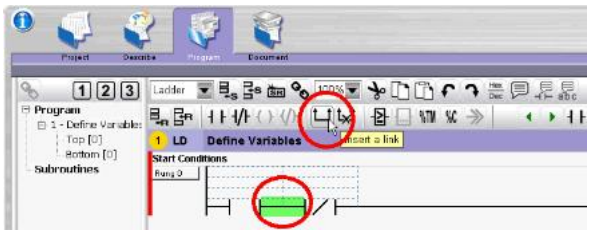
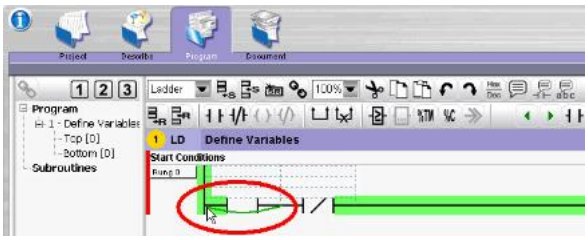
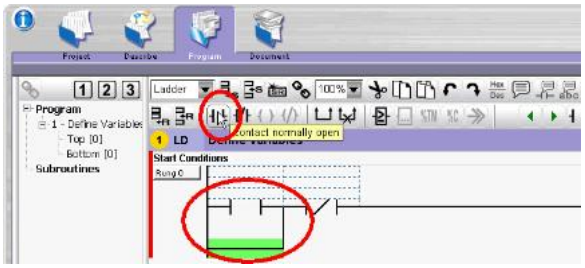
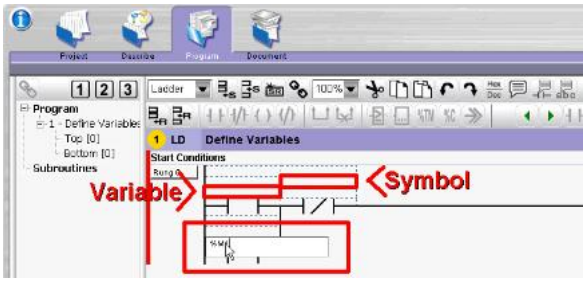
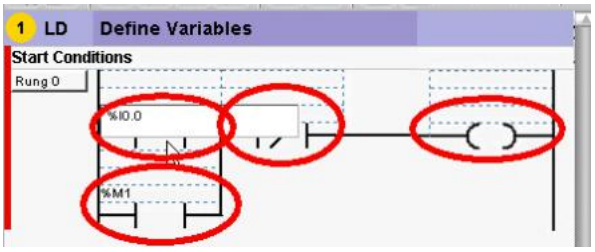
3	The re-sized workspace.	

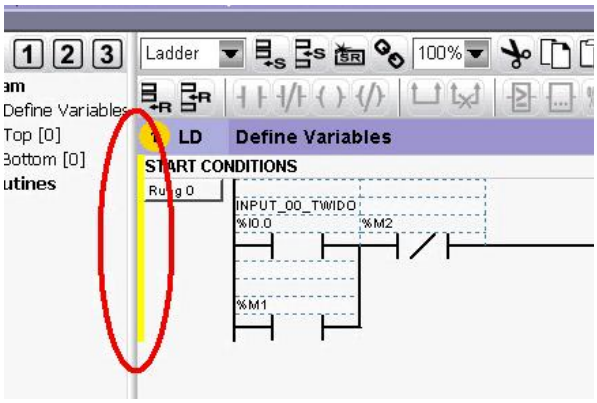
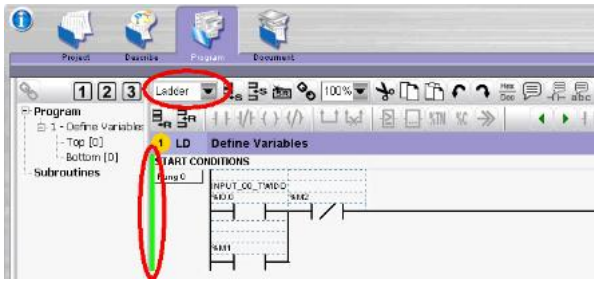
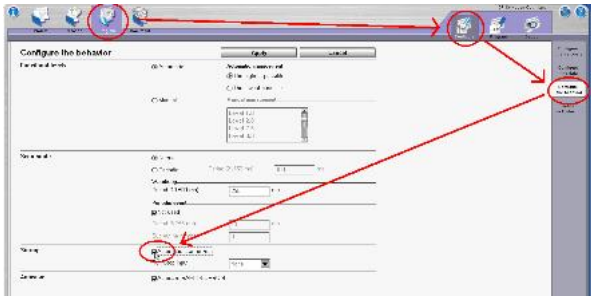
Variable List

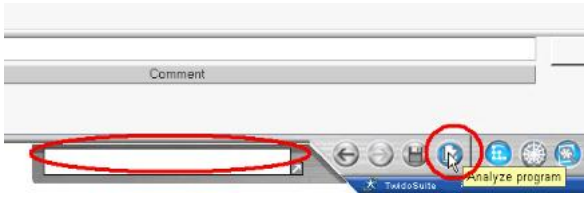
1	In the variable list you can add **symbol**s, give them a memory **address** and input a **comment** about them.	
2	To add a **symbol** click on the **insert** icon. First enter the symbol name. Now you can add the **address** and a **comment**.	
3	Use the different column headers as sort criteria to sort the table in alphabetical order.	

Create an application Program

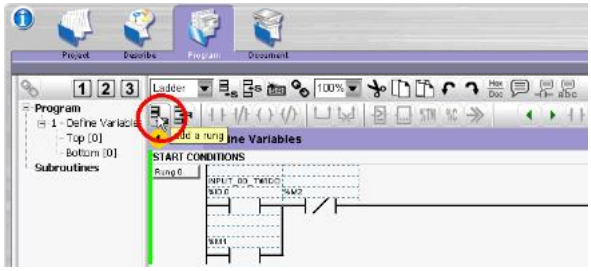
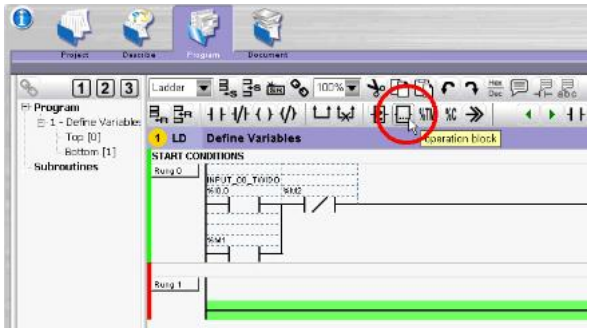
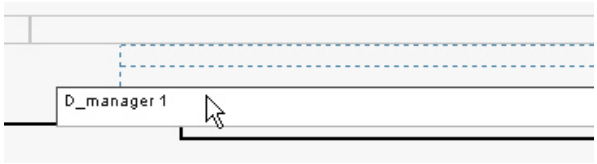
1	Use the Edit Program function to go to the program editor. Starting a new program always begins with LADDER as the programming language. You can only view the program in LIST mode once the first rung has been completed and analysed.	
2	Starting with an empty program, add a section. This will create a section with empty rungs. The first rung is marked in red on the LHS to denote that it has logical errors.	
3	Click on the top of a rung to rename it.	
4	You can also rename the section	
5	Clicking on the rung changes its colour to green and indicates the current rung being edited. Clicking on an icon in the toolbar inserts the selected object at the first available place on the rung. So, you can add contacts…	
6	….and outputs, etc.	

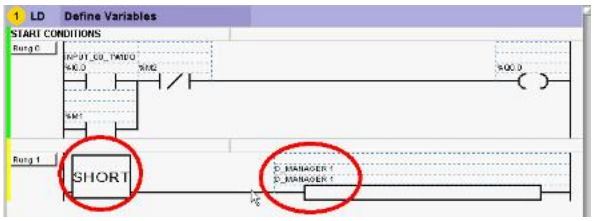
7	To make a logical connection, simply mark the source and pull it to the destination. All possible connecting points are shown in green	
8	Once a link has been inserted you can add a contact to form the logical OR.	
9	To assign an object to an address or variable, click on the upper half of the object	
10	The editor automatically recognises whether a rung is syntactically complete and marks it in yellow. The rung, however,has not yet been analysed. The **Analyze program** button is in the bottom right hand corner.	
11	The Analysis is done for all contacts.	

12	If the analysis is error free, the yellow band changes to green. You can now change the display mode to LIST if you wish.	
13	If erros are found, these are listed at the bottom of the edit field. Click on the arrow icon to enlarge the display.	
14	A common error is **No Start In Run Was Selected**	
15	To fix this, select: **Program->** **Configure->** **Configure the behavior** In the **Configure the Behavior** dialog select: **Automatic start in Run** This is an operation mode that causes the PLC to start up automatically on return of power after a power failure.	

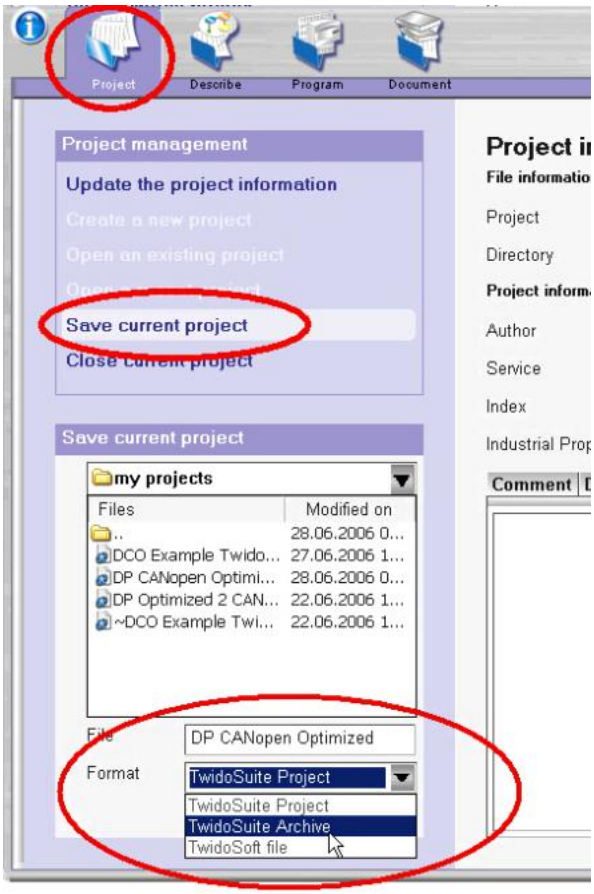
16	After restarting the analysis the error field is empty.	

Macro Drive

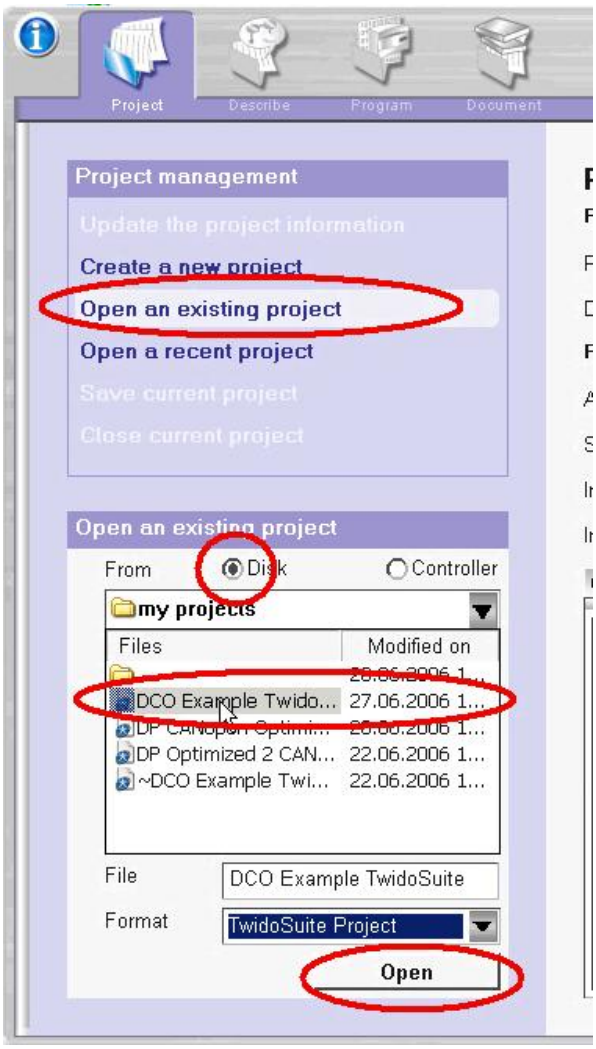
1	To use the macros for the drives, a second rung is added using the **add a rung** icon.	
2	Insert an operation block for the macro.	
3	To link the operation block to the macro drive input **D_manager 1**. D_manager is the macro function to access the drive and the 1 indicates Drive 1.	
4	The space between D_manager and the 1 is mandatory.	

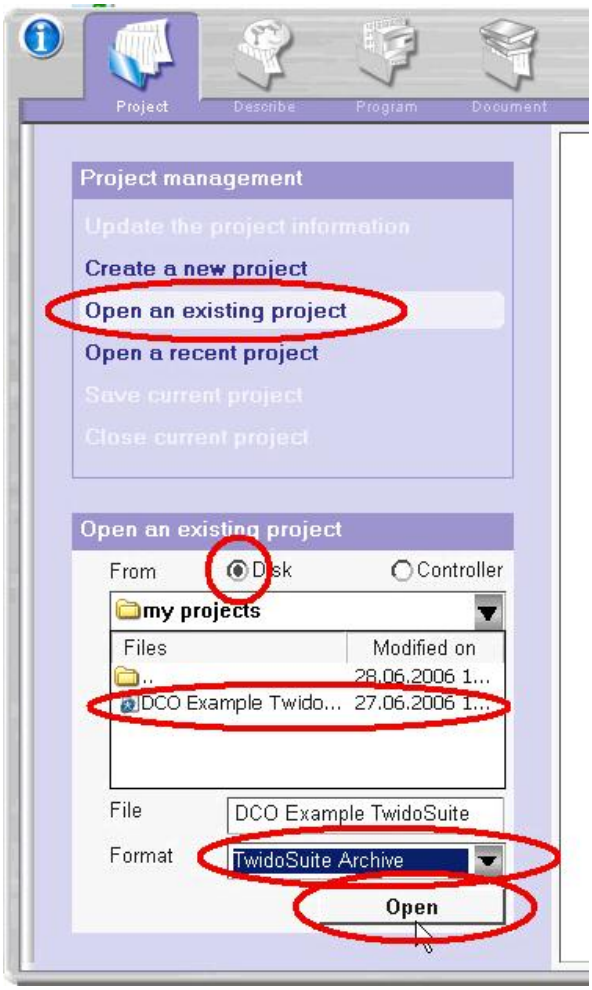
5	As the macro is already configured, the address field also contains the symbolic macro name **D_MANAGER 1**. The **SHORT** seen here must be exchanged for a control variable. You can now repeat this for the other macros: **D_CLEAR_ERR** **D_RUN_FWD** **D_RUN_REV** **D_STOP und** **D_SELECT_SPEED** .	

Save / export the project

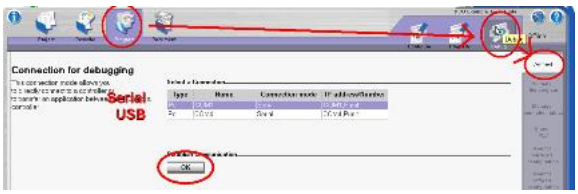
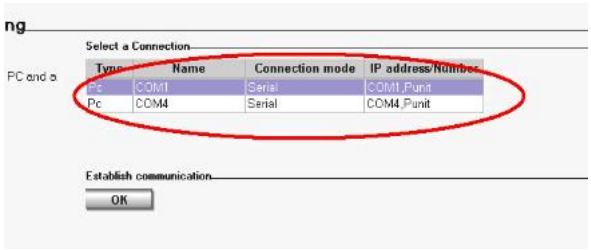
1	To save the project select **Save current project** in the **Project** menu. In the **Save current project** window you can select the folder for the save, input the **file** name and designate the file **Format**. You can save the file as a normal **Project** file or as an **Archive** file. The **Archive** file has the advantage of being portable and is a single file.	

Open / Import a Project

1	To open a project use the **Open an existing project** function in the **Project** menu. In the **open an existing project** window select the medium : **disk** or **Controller** Give the file type under **Format (**for a project file: **Project)**, select the folder and select the file you wish to open. When ready click on **Open** to open the project	

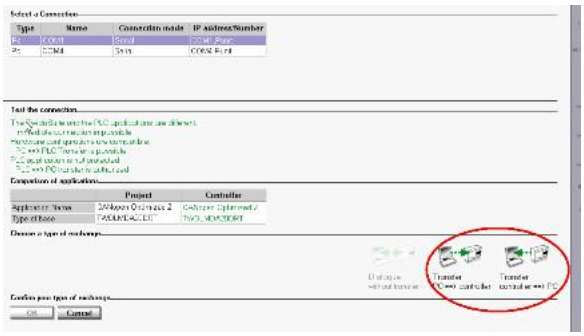
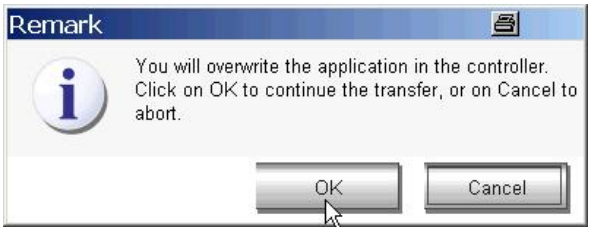
2	Proceed as above except for Import the file type is **Archive.**	

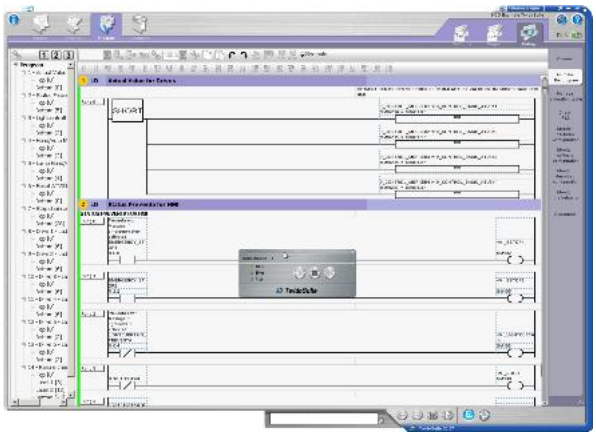
Connecting to the Twido PLC

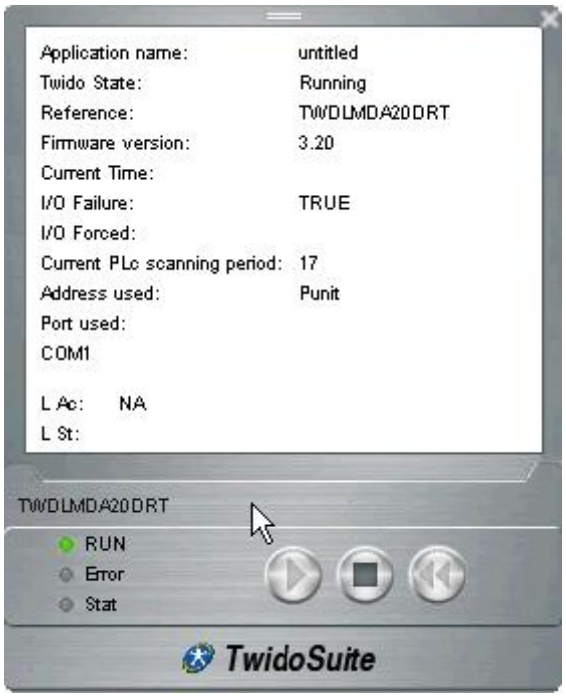
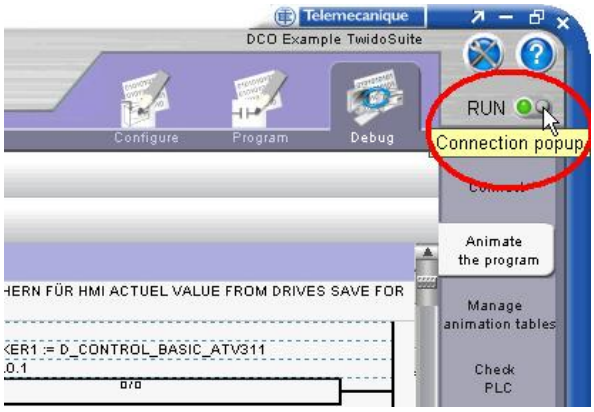
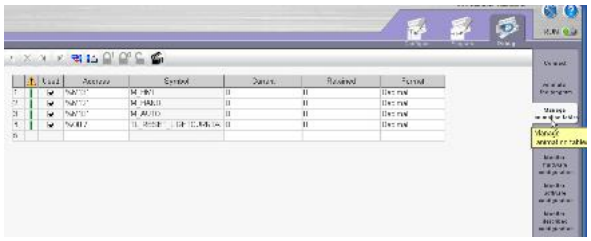
1	To connect the PC to the Twido PLC select **Program** in the main menu, then **Debug** in the sub-menu to get access to the connect selection.	
2	You can now either configure a new connection (see menu at bottom of window) or select a pre-configured connection. To connect click on **OK**.	

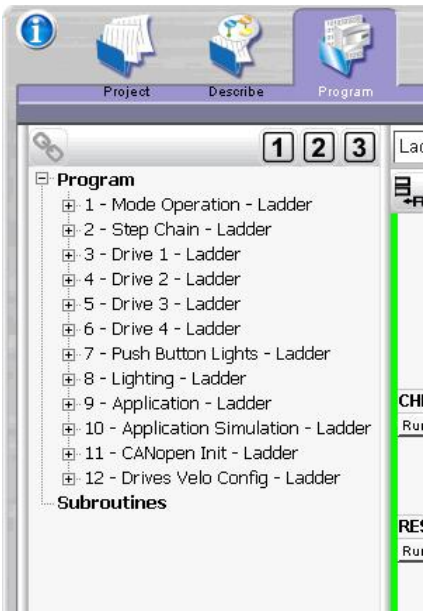
3	you will be shown a progress bar while Twidosuite establishes the connection.	

Download a Program

1	After succesfully connecting to the Twido, Twidosuite compares the status of the project and the Twido PLC. Now you can either download your project or upload the contents of the PLC.	
2	To download the project select: **Transfer PC->controller** and confirm with OK	
3	If the Twido is already running it must be stopped first. Confirm with **OK** if you wish to proceed.	
4	You will be shown a warning that the contents of the PLc are about to be overwritten confirm with **OK** to continue.	
5	The download condition is indicated with a process bar.	

6	After a successful download, Twidosuite jumps automatically to the online viewing.	
7	A control panel appears in the foreground. Here you can start and stop the PLC. The upper button extends the window, offering more PLC status information	
8	If you start the PLC you will be asked to confirm the action If you wish to proceed with the start click on **OK**.	
9	After successfully starting the PLC the **RUN** LED changes from yellow to green.	

10	Here the expanded window with the PLC in run mode.	
11	If the online status window is closed, a click in the upper left hand corner of the main window opens it again.	
12	The sub-menu **Manage animation tables** allows acces to animation tables.	

13	Use the project browser to navigate through the program sections.	

Data Communication

Introduction

This chapter describes the data transferred via the communcations bus (e.g. Modbus or CANopen) that is not bound directly with digital or analog hardware.

The list contains:

- The devices concerned
- Direction of Data flow
- symbolic name and
- Bus address of the device concerned.

Devices Concerned

This application uses Modbus and CANopen busses.

CANopen connects the following devices:
A twido PLC on bus address 127 (fixed)
4 Altivar variable frequence drives, bus adresses 1..4

The **Modbus** connects:
Magelis-Panel XBT-G, bus address 1
Twido PLC, bus address 2

Datalink Drive_1 <> PLC

Twido-PLC *(CANopen-Master, #127)*		**Altivar 31, Drive_1** *(CANopen-Slave#1)*	
Data Direction ATV -> PLC			
Address	**Name**	**Index**	**Designation**
%IWC1.0.0	D_STATUS_DRIVE_1	6041	Drivecom status register
%IWC1.0.1	D_CONTROL_DRIVE_1	6044	Control effort
%IWC1.0.2	D_IERROR_DRIVE_1	603F	Error Code
Data Direction PLC -> ATV			
Address	**Name**	**Index**	**Designation**
%QWC1.0.0	D_COMMAND_DRIVE_1	6040	Drivecom command register
%QWC1.0.1	D_TARGET_DRIVE_1	6042	Target velocity

Datalink Drive_2 <> PLC

Twido-PLC *(CANopen-Master, #127)*		**Altivar 31, Drive_2** *(CANopen-Slave#2)*	
Data Direction ATV -> PLC			
Address	**Name**	**Index**	**Designation**
%IWC1.1.0	D_STATUS_DRIVE_2	6041	Drivecom status register
%IWC1.1.1	D_CONTROL_DRIVE_2	6044	Control effort
%IWC1.1.2	D_IERROR_DRIVE_2	603F	Error Code
Data Direction PLC -> ATV			
Address	**Name**	**Index**	**Designation**
%QWC1.1.0	D_COMMAND_DRIVE_2	6040	Drivecom command register
%QWC1.1.1	D_TARGET_DRIVE_2	6042	Target velocity

Datalink
Drive_3 <> PLC

Twido-PLC *(CANopen-Master, #127)*		**Altivar 31, Drive_3** *(CANopen-Slave#3)*	
Data Direction ATV -> PLC			
Address	**Name**	**Index**	**Designation**
%IWC1.2.0	D_STATUS_DRIVE_3	6041	Drivecom status register
%IWC1.2.1	D_CONTROL_DRIVE_3	6044	Control effort
%IWC1.2.2	D_IERROR_DRIVE_3	603F	Error Code
Data Direction PLC -> ATV			
Address	**Name**	**Index**	**Designation**
%QWC1.2.0	D_COMMAND_DRIVE_3	6040	Drivecom command register
%QWC1.2.1	D_TARGET_DRIVE_3	6042	Target velocity

Datalink
Drive_4 <> PLC

Twido-PLC *(CANopen-Master, #127)*		**Altivar 31, Drive_4** *(CANopen-Slave#4)*	
Data Direction ATV -> PLC			
Address	**Name**	**Index**	**Designation**
%IWC1.3.0	D_STATUS_DRIVE_4	6041	Drivecom status register
%IWC1.3.1	D_CONTROL_DRIVE_4	6044	Control effort
%IWC1.3.2	D_IERROR_DRIVE_4	603F	Error Code
Data Direction PLC -> ATV			
Address	**Name**	**Index**	**Designation**
%QWC1.3.0	D_COMMAND_DRIVE_4	6040	Drivecom command register
%QWC1.3.1	D_TARGET_DRIVE_4	6042	Target velocity

Datalink
HMI -> PLC

Twido-PLC *(Modbus #2)*		**HMI Magelis XBT-G***(Modbus #1)*	
Data Direction HMI -> PLC			
Address	**Name**	**Address**	**Designation**
%M1	RESET	2	General_Reset
%M3	AUTOMATIC_SEL	4	Automatic_Selection
%M4	MANUAL_SEL	5	Manual_Selection
%M7	SIMU_START	8	Auto_Start
%M8	RESET_STEPS	9	Reset_steps
%M16	CANOPEN_RESET	17	CANopen.Reset_CANopen
%MW11:X1	MANUAL_START_FWD_DRIVE_1	40012:1	Drive01.Forward_manu
%MW11:X2	MANUAL_START_BWD_DRIVE_1	40012:2	Drive01.Revers_manu
%MW12:X1	MANUAL_START_FWD_DRIVE_2	40013:1	Drive02.Forward_manu
%MW12:X2	MANUAL_START_BWD_DRIVE_2	40013:2	Drive02.Revers_manu
%MW13:X1	MANUAL_START_FWD_DRIVE_3	40014:1	Drive03.Forward_manu
%MW13:X2	MANUAL_START_BWD_DRIVE_3	40014:2	Drive03.Revers_manu
%MW14:X1	MANUAL_START_FWD_DRIVE_4	40015:1	Drive04.Forward_manu
%MW14:X2	MANUAL_START_BWD_DRIVE_4	40015:2	Drive04.Revers_manu

Datalink
PLC -> HMI

Twido-PLC *(Modbus #2)*		**HMI Magelis XBT-G***(Modbus #1)*	
Data Direction PLC -> HMI			
Address	**Name**	**Address**	**Designation**
%M5	MANUAL_MODE	6	Manual_Mode
%M6	AUTOMATIC_MODE	7	Automatic_Mode
%M10	AUTO_START_STATE	11	Auto_Start_State
%MW1	STEP_REGISTER	40002	Stepregister
%MW33	D_ERROR_1	40034	Drive01.Errorcode
%MW48	D_SELECT_SPEED_VAL_1	40049	Drive01.act_speed
%MW63	D_ERROR_2	40064	Drive02.Errorcode
%MW78	D_SELECT_SPEED_VAL_2	40079	Drive02.act_speed
%MW93	D_ERROR_3	40094	Drive02.Errorcode
%MW108	D_SELECT_SPEED_VAL_3	40109	Drive03.act_speed
%MW123	D_ERROR_4	40124	Drive02.Errorcode
%MW138	D_SELECT_SPEED_VAL_4	40139	Drive03.act_speed
%MW11:X13	STOP_DRIVE_1	40012:13	Drive01.Stopped
%MW11:X14	ERROR_DRIVE_1	40012:14	Drive01.Error_ATV
%MW12:X13	STOP_DRIVE_2	40013:13	Drive02.Stopped
%MW12:X14	ERROR_DRIVE_2	40013:14	Drive02.Error_ATV
%MW13:X13	STOP_DRIVE_3	40014:13	Drive03.Stopped
%MW13:X14	ERROR_DRIVE_3	40014:14	Drive03.Error_ATV
%MW14:X13	STOP_DRIVE_4	40015:13	Drive04.Stopped
%MW14:X14	ERROR_DRIVE_4	40015:14	Drive04.Error_ATV

Datalink
PLC <> HMI

Twido-PLC *(Modbus #2)*		**HMI Magelis XBT-G***(Modbus #1)*	
Data Direction PLC -> HMI			
Address	**Name**	**Address**	**Designation**
%MW27:X0	ERROR_CO_MASTER	40028:0	CANopen.Error_Master
%MW27:X1	ERROR_SLAVE_1	40028:1	CANopen.Error_Drive01
%MW27:X2	ERROR_SLAVE_2	40028:2	CANopen.Error_Drive02
%MW27:X3	ERROR_SLAVE_3	40028:3	CANopen.Error_Drive03
%MW27:X4	ERROR_SLAVE_4	40028:4	CANopen.Error_Drive04
%MW2:X0	STEP_0_ACTIVE	40003:0	Step_0
%MW2:X1	STEP_1_ACTIVE	40003:1	Step_1
%MW2:X2	STEP_2_ACTIVE	40003:2	Step_2
%MW2:X3	STEP_3_ACTIVE	40003:3	Step_3
%MW2:X4	STEP_4_ACTIVE	40003:4	Step_4
%MW2:X5	STEP_5_ACTIVE	40003:5	Step_5
%MW2:X6	STEP_6_ACTIVE	40003:6	Step_6
%MW2:X7	STEP_7_ACTIVE	40003:7	Step_7
%MW2:X8	STEP_8_ACTIVE	40003:8	Step_8
%MW2:X9	STEP_9_ACTIVE	40003:9	Step_9
%MW2:X10	STEP_10_ACTIVE	40003:10	Step_10
%MW2:X11	STEP_11_ACTIVE	40003:11	Step_11
%MW2:X12	STEP_11_ACTIVE	40003:12	Step_12

Datalink
PLC <> HMI

Twido-PLC *(Modbus #2)*		**HMI Magelis XBT-G***(Modbus #1)*	
Data Direction PLC <> HMI (read and write)			
Address	**Name**	**Address**	**Designation**
%MW15	DRIVE_1_MANU_VELO	40016	Drive01.Manu_Velo
%MW16	DRIVE_2_MANU_VELO	40017	Drive02.Manu_Velo
%MW17	DRIVE_3_MANU_VELO	40018	Drive03.Manu_Velo
%MW18	DRIVE_4_MANU_VELO	40019	Drive04.Manu_Velo
%MW19	AUTO_VELO_1	40020	Auto_velo_1
%MW20	AUTO_VELO_2	40021	Auto_velo_2
%MW21	AUTO_VELO_3	40022	Auto_velo_3
%MW22	AUTO_VELO_4	40023	Auto_velo_4
%MW23	AUTO_VELO_5	40024	Auto_velo_5
%MW151	BOTTOM_LAYERS_SET1	40152	Bottom_Layers_1_setpoint
%MW152	BOTTOM_LAYERS_SET2	40153	Bottom_Layers_2_setpoint
%MW153	TOP_LAYERS_SET	40154	Top_Layers_setpoint
%MW154	BOTTOM_LAYERS_ACT1	40155	Bottom_Layers_1_actual
%MW155	BOTTOM_LAYERS_ACT2	40156	Bottom_Layers_2_actual
%MW156	TOP_LAYERS_ACT	40157	Top_Layers_actual

Devices

Introduction

This chapter describes the steps required to initialise and configure the devices to attain the described system function. To do this we use the Powersuite software.

General

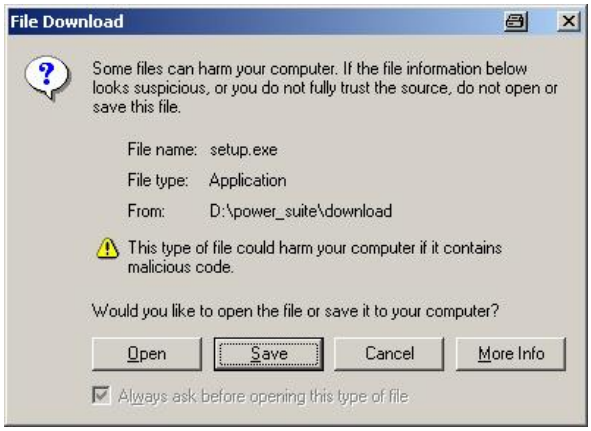
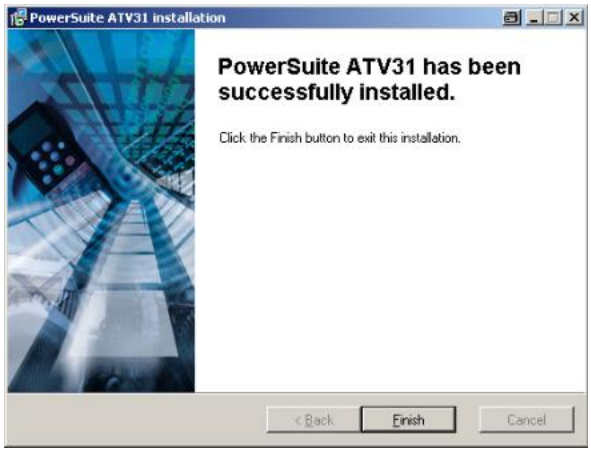
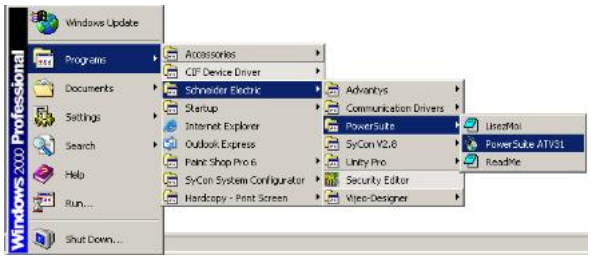
You can configure the altivars using the front panel on the device itself, however,using the software tool Powersuite has certain advantages:

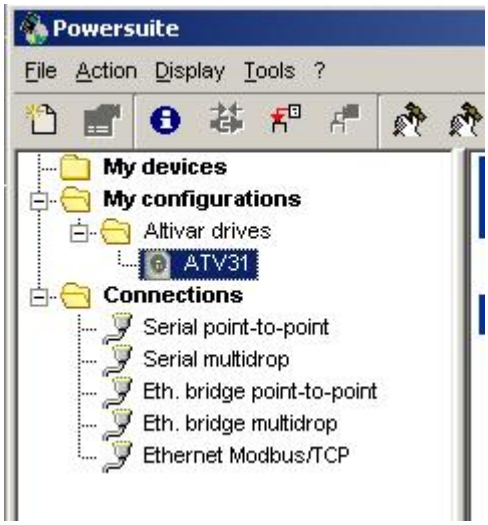
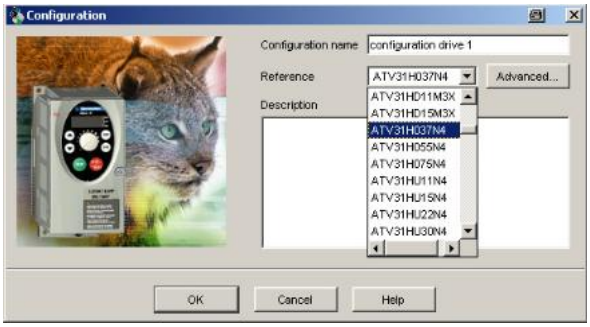
- Save data to your hard drive and duplicate it
- Print documentation for your configuration
- Test and optimise the parameters online.

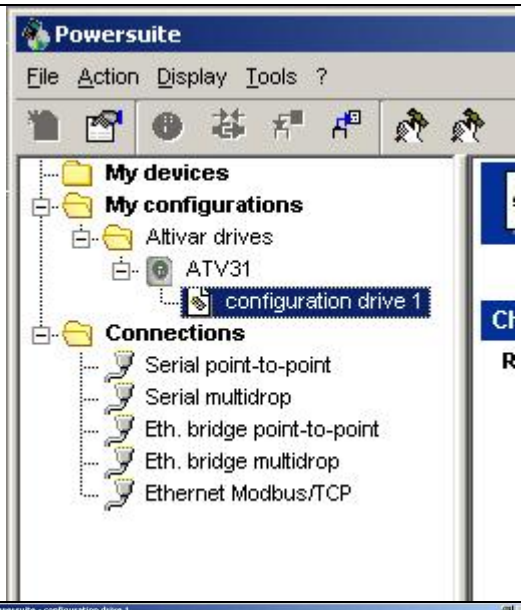
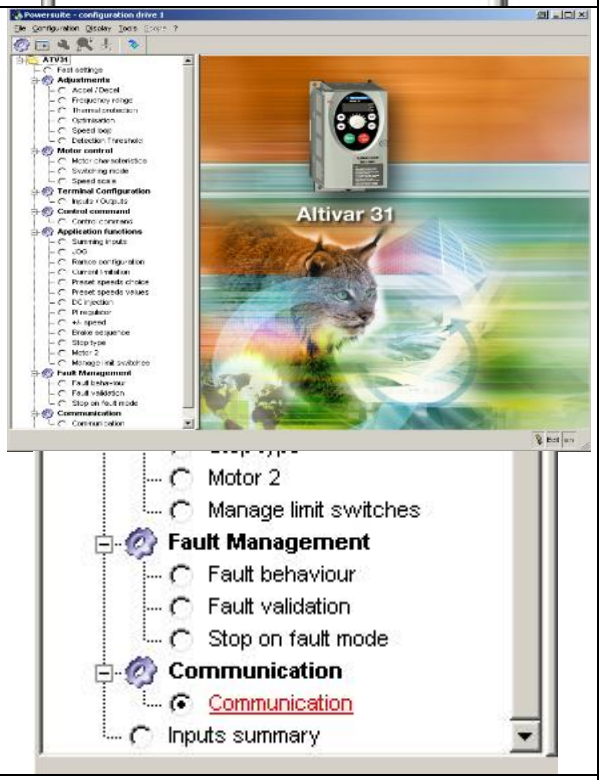
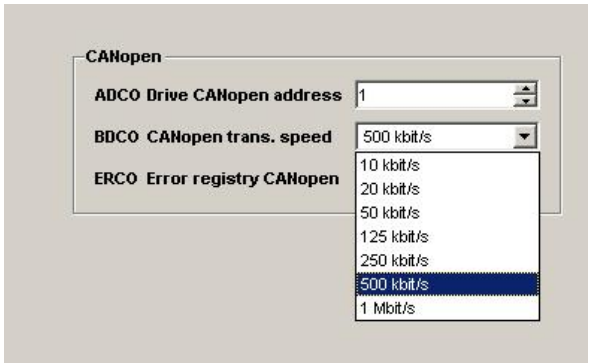
The CD which accompanies the altivar drive not only holds documatation on the drive but also has a light version of powersuite to enable a quick set up of the drive. (note: the version of the factory setup actually delivered in your drive may be different to the version of the factory setup as found on the CD. If you wish to retain the factory setup as delivered in your drive you should first upload the factory setup from your drive to your PC)

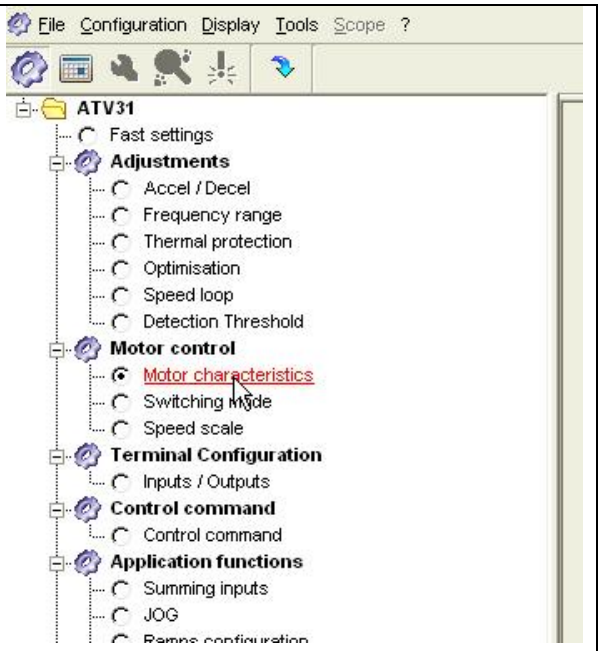
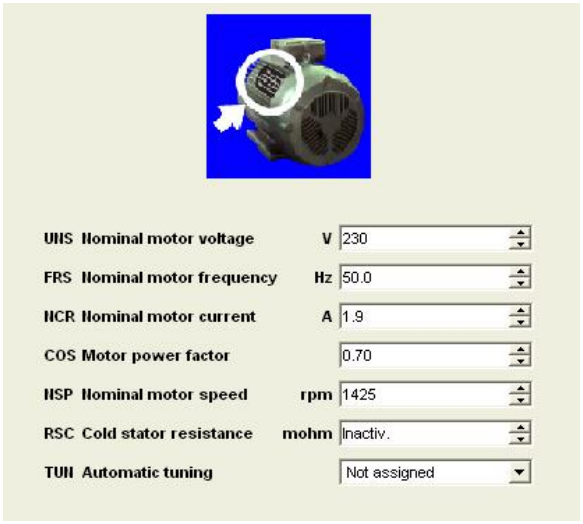
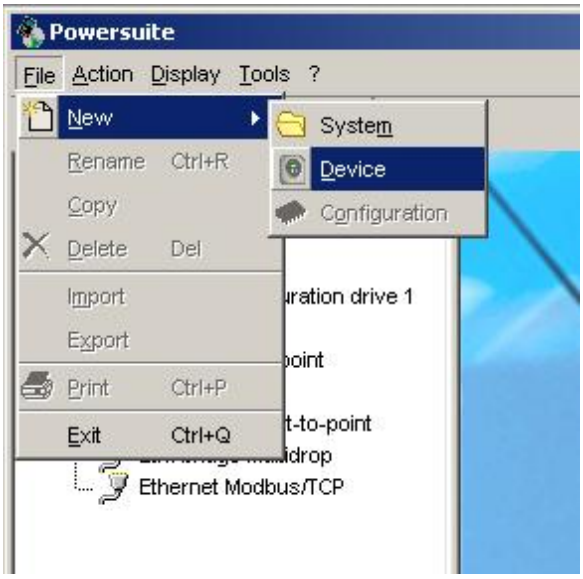
Start Program

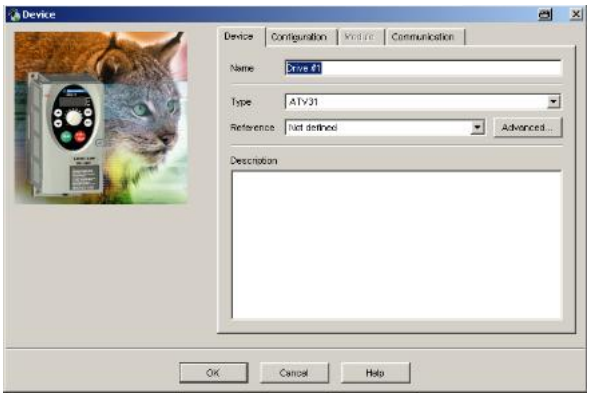
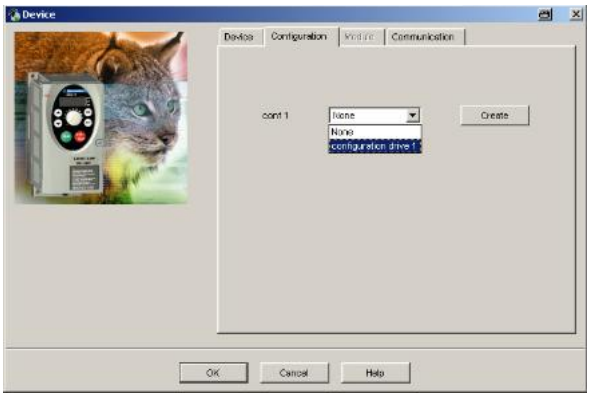
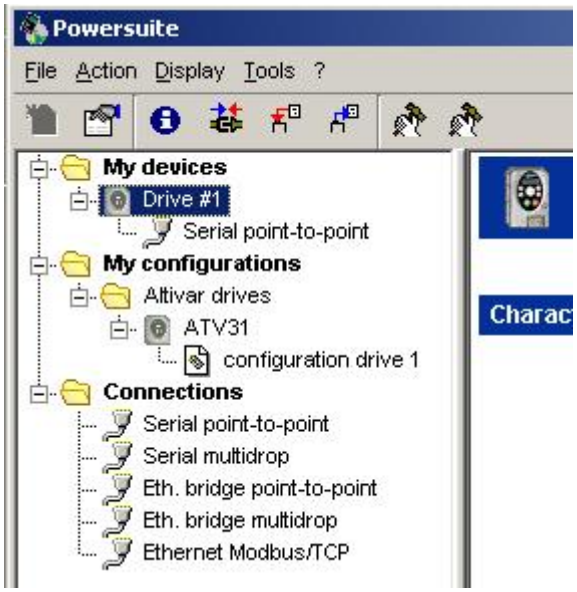
1	If your Windows operating system is set up for it, the CD will start up automatically. The CD runs just like an online installation from a website. To install Powersuite click on **PowerSuite** to the right of the CD icon.	
2	Follow the directions given and click on: **click here to install the software**	

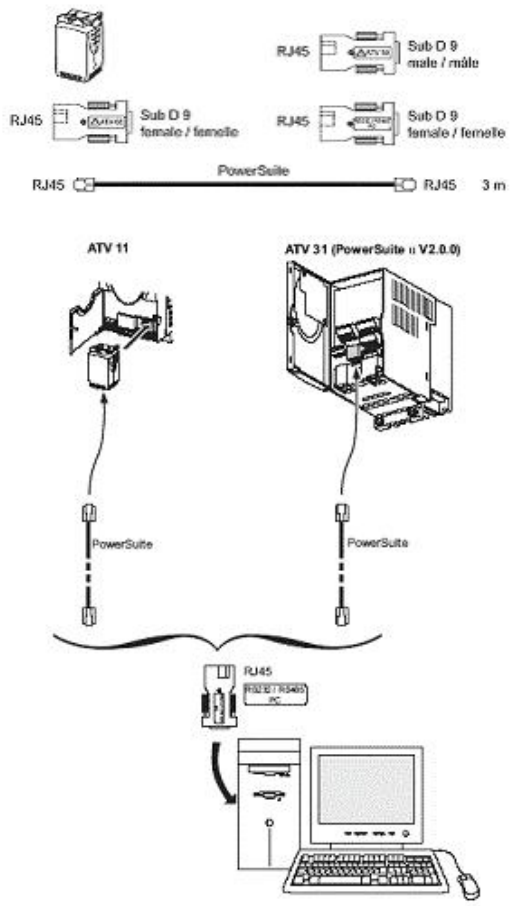
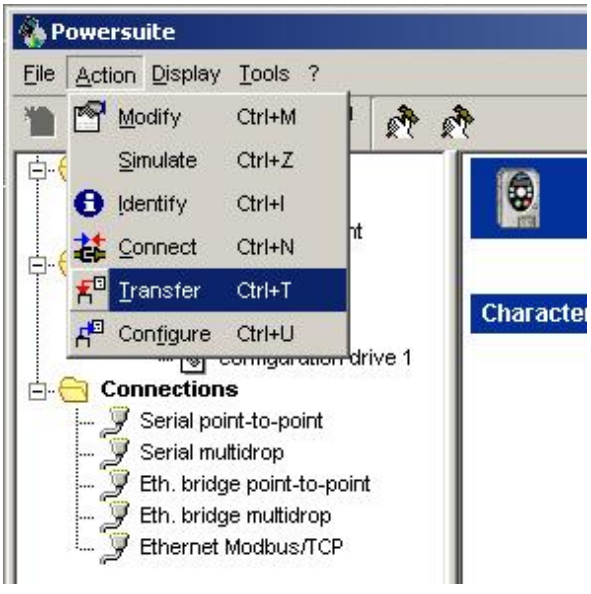
3	Click on **Open** to confirm installation of the software.	
4	Finally click on **Finish** to complete the installation. You can now start up Powersuite without restarting your PC.	
5	You will find PowerSuite under the start menu: **Programs->** **Schneider Electric->** **PowerSuite** Here click on: **Powersuite ATV31** to start the tool.	
6	The tools displays the standard screen on start up. In the menu **Display** click on **Configurations**	

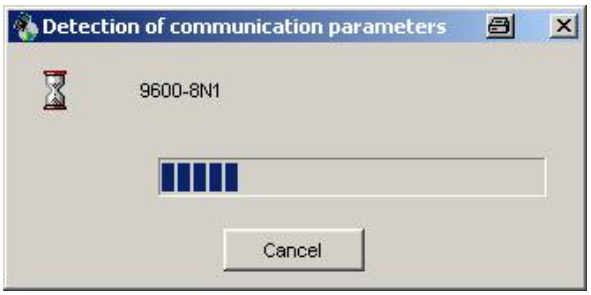
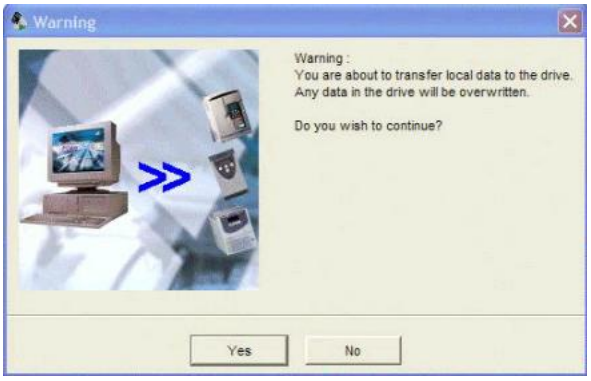
7	Use the project browser on the left side of the window to view your project	
8	To work with the drive you must create a new configuration. Click on **ATV31** in the project broswer And then on: **File->New->Configuration**	
9	A new window opens up. Here you can input a name for your configuration, a description and select the drive type – in our case **ATV31H037N4**. Close the dialog with **OK**.	

10	The name of the configuration now appears in the project browser below **ATV31**. Double click on the configuration name to open up a window to edit the configuration	
11	To communicate with the Twido PLC via CANopen, the Altivar must know which address and baud rate to use. On the left hand side you see a list of parameter groups. Clicking on a group opens up an edit window with the parameters for that group. Select **Communication** in the parameter group **Communication**.	
12	In the dialog that opens, insert the Addresses 1 to 4 und 500kbit/s baudrate for each. Save your changes using the menu **File-> Save** and close the configuration with **File->close**. Any further changes you wish to make to the configuration can be be done in the same way.	

13	For each Altivar you must input the motor data. To do this select: **Motor Control->** **Motor Characteristics**	
14	Input the motor data	
15	After finishing the configuration you must now create a device that uses this configuration Click on **devices** in the project browser, then on: **File->New->Device** to go to the input dialog to create a new device.	

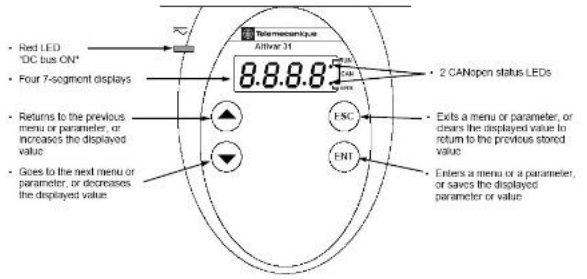
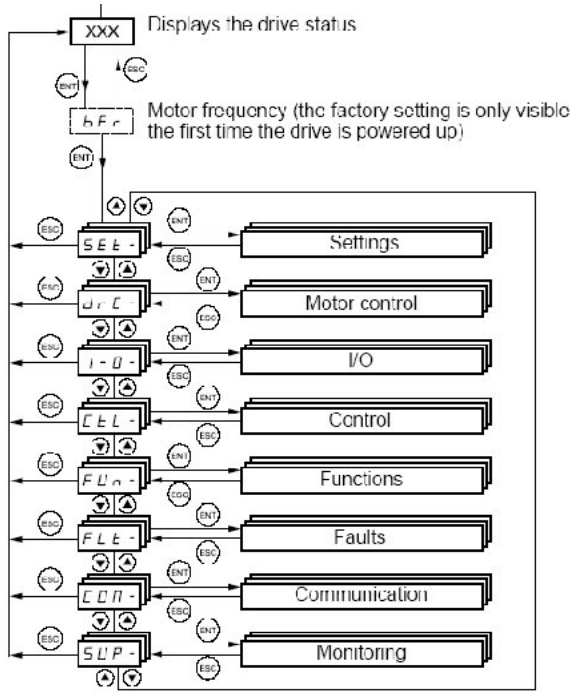
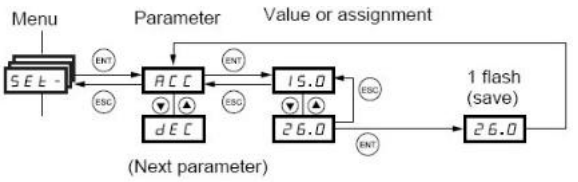
16	Give the device a name. – note, configuration and device names must be unique. And describe your device as you wish… serial number, physical position in system, document number etc.	
17	Click on the tab **Configuration**. Here you can select your configuration From the list and assign it to your device. You can ignore the tab **Communication** for the moment Close the dialog with OK	
18	The device name can now be seen in the project browser. You need only to mark the device name to select which configuration is to be downloaded to the drive	

19	Use the connecting set VW3A8106 to connect the COM on your PC to the RJ45 socket on the Drive. If you used CAN taps, be careful that the PC is connected to the middle socket on the tap and that only the target drive is connected to the tap.	
20	Making sure the correct device is marked in the project browser first,use the menu **Action->Transfer** to download your configuration to the drive.	

21	Before the download proceeds you will receive a warning that must be read and acknowledged.	
22	Powersuit displays a progress bar as it prepares for the download.	
23	To successfully complete the download, Powersuite asks for confirmation. Repeat the procedure to configure the other drives but remember you must use different bus addresses for the other drives (so you must create new configurations with new devices).	
24	**To activate the downloaded bus parameters (address and baudrate) you must now switch off the controller (display goes off). On switching back on, the new parameters are ready.**	

Manual Input using the Altivar Front Panel

You can configure the ATV 31 by inputting the parameters using the front panel display and buttons on each Altivar, as follows:

1	The CANopen-Address and Baudrate can be input using the buttons on the front panel of the Altivar.	
2	Using the buttons on the front panel, select the sub-menu **Communication** auszuwählen.	
3	In the **Communication** sub-menu input the CANopen address in the parameter **AdC0.** In the example application the adresses for the four controlers are 1 to 4.	
4	Also in the **Communication** sub-menu, in the parameter **BdC0,** set the baudrate to **500.0** (kBits).	
5	Alternatively you can use the PowerSuite software to configure the CANopen addresses and baudrates.	
6	**To activate the downloaded bus parameters (address and baudrate) you must now switch off the controller (display goes off). On switching back on, the new parameters are ready.**	

Appendix

Detailed Component List

Hardware-Components – Group 1: Mains Switch				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
1.1	1	Mains switch 3-pole 36 kA Compact NS100 N	29003	
1.2	1	Connector cover 3-pole	29321	
1.3	1	Switch Mounting TM16D 12-16 A 3-pole	29035	
1.4	1	Undervoltage Protector 230V	29407	
1.5	1	Fuse Undervoltage release 1A (C-Automation) and 230V Contactor	23725	
1.6	1	Actuator accessory 1 NC	29450	
1.7	1	Locking device fixed	29371	
1.8	1	Rotary drive with door switch (red-yellow)	29340	

Hardware-Components – Group 2: Emergency Stop				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
2.1	1	Mushroom switch red-yellow (E-Off)	XB5AS844	
2.2	1	Contact block for E-OFF switch, 2NÖ	XB5AZ141	
2.3	1	E-OFF Sign, red-yellow, 60mm diameter	ZBY9330	
2.4	1	Emergency Off Switch, Tamper free	XALK178G	
2.5	1	Preventa Safety Relay	XPSAC5121	
2.6	1	Fuse for Safety, 1P, C2A	23726	
2.7	2	Redundant Contactors 18A 24V control circuit	LC1D18BD	
2.8	1	Acknowledge/Indicator Safety	XB5AW-36B5	
2.9	1	Einfachtastergehäuse	XALD01	
2.6	1	Switch Housing	XALD01	

Hardware-Components – Group 3: Door Safety				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
3.1	1	Preventa Safety Relay	XPSAC5121	
3.2	1	Door Safety Switch	XCSA502	
3.3	1	Actuator door Safety	XCSZ02	
3.4	1	Acknowledge/Indicator Safety	XB5AW-36B5	
3.5	1	Switch Housing	XALD01	

Hardware-Components – Group 4: Display and Indicators				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
4.1	1	Signal Column, connector element	XVBC11	
4.2	1	Signal Column, tube	XVBC02	
4.3	1	Connector element	XVBC21	
4.4	1	Signal element red (System Fault)	XVBC2B4	
4.5	1	Signal element blue (Door Safety)	XVBC2B6	
4.6	1	Signal element white (PLC on, mains on)	XVBC2B7	
4.7	1	Signal element green (Drives Running, System On)	XVBC2B3	
4.8	1	Double switch housing	XALD02	

Hardware-Components – Group 5: Automation Components				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
5.1	1	Primary Fuse for PLC 1P,C1A	23725	
5.2	1	Twido PLC Modular	TWDLMDA20DRT	
5.3	1	CanOpen-Card	TWDNCO1M	
5.4	1	CanOpen-Plug	TSXCANKCDF 90TP	
5.5	2	Branch socket CANopen	VW3CANTAP2	
5.6	4	CAN Bus cable 1 m	VW3CANCARR1	

Hardware-Components – Group 6: Magelis HMI				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
6.1	1	Circuit Breaker fused for HMI 1P, C1A	23725	
6.2	1	Magelis Panel XBT-G 2330, 5,7", Colour, with Ethernet	XBTG2330	
6.3	1	Interface cable to Twido	PCX1031	

Hardware-Components – Group 7: 24-Volt Power supply				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
7.1	1	Main fuse 24V/3A, 2P, 1DA	24516	
7.2	1	Power Supply 240 VAC 1phase , 24VDC 3A	ABL7RE2403	
7.3	1	Primary fuse 24V/5A, 2P, D1,5 A	23728	
7.4	1	Power supply 240 VAC 1phase, 24VDC5A	ABL7RE2405	

Hardware-Components – Group 8: Drives and Power				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
8.1	2	Magnetic circuit breaker 2,5A	GV2L07	
8.2	2	Magnetic circuit breaker 4,0A	GV2L08	
8.3	4	Switch cover	GVAE11	
8.4	2	Altivar Drive 0,37 kW 3~	ATV31H037N4	1.7
8.5	2	Altivar Drive 0,55 kW 3~	ATV31H055N4	1.7
8.6	4	ATV31 Adapter for DIN rail	VW3A31852	
8.7	4/8	contactor 6A (AC3), 1xNC	LP4K0601BW3	

Software-Components – Group 9				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
9.1	1	TwidoSuite Programming Software incl. Cable	TWDBTFU10EF	01.00
9.2	1	Twido Programming and HMI Communication cable	TSXPCX1031	
9.3	1	Programming software for Magelis XBT-G	VijeoDesigner	4.4
9.4	1	Programming cable Magelis	XBTZG915	
9.5	1	Configurationsoftware PowerSuite ATV31	CD with the ATV31	
9.6	1	Altivar-Set PC connection accessories	VW3A8106	

Control Cabinet Components – Group 10 (SAREL)				
Pos.	**Amt.**	**Description**	**Part-Number**	**Rev./ Vers.**
10.1	1	Cabinet, 800x600x300mm (HxBxD, with mounting plate, Sarel)	ENN83357	
10.2	1	Fuse for Fan, 2P, C2A	23747	
10.3	2	fan, with filter, 230V, 56 m³/h (Sarel)	ENN17901	
10.4	2	Filter for fan (Sarel)	ENN17911	
10.5	1	Thermostat for Fan, 0..60°C (Sarel)	ENN17562	

Component Protection Classes

Positioning Protection class

Component	In Field, On site			Cabinet		
				Front		inside
	IP54	IP65	IP67	IP55	IP65	IP20
E-Off switch				X		X
Emergency off switch housing		X				
Mains Switch, with or without undervoltage protection and integrated indicator						X
Rotating Door handle for master switch				X		X
contactor LC1D** und LP4K**						X
Contactors and fuses, all types						X
Phaseo Power supply						X
E-Off safey switches XPSAC***						X
Twido PLC and expansion modules						X
Magelis XBTG Touch panel, all types					X	X
Altivar 31 Drive, 3phase, 380/500V AC, all types						X
CANopen TAPS						X
Switch series „Harmony“ in housing		IP66				
Filter und Filterfan				IP40		
Fan-Thermostat						X

Component Features

Components

PLC Twido

This example uses a Twido modular PLC with Twidosuite software and programmiing cable set (TWDLMDA20DRT+ TWDBTFU10EF + TSXPCX1031):

- 24VDC
- 12 digital inputs
- 8 digital relay outputs
- extensible up to 7 modules (analog- und communications modules also available)

2 Programming Languages:

- Contact plan (COP)
- Statement list (STL)

TWD LMDA 20DRT

Pre-defined functions:

- Drum control
- Fast Counters up to 5kHz
- Very Fast counters up to 20 kHz
- Frequency measuring 1..20 kHz
- Reserved Memory for LIFO/FIFO-processing
- PWM-/PLS-Outputs
- External PLC-Start
- PID-controller

CANopen master module TWDNCO1M

Master Module for Twido PLCs with:

- Control of up to 16 Slaves (Depends on number of PDOs/SDOs)
- Baudrates 125 / 250 / 500 kBit/s
- Slave watchdog with Node Guarding or Heartbeat
- Configuration tool integrated in Twidosuite
- Bus configuring via Modul Rear wall on the PLC
- Integrated macros for quick installation
- Slim Format (30mm width)
- Plugable contacts for power supply
- Configuration by PLC during switch on

Components contd.

Safety Module: Preventa XPSAF5130

Main technical characteristics:

For monitoring	Emergency stop
Max. category accord. EN954-1	4
No. of safety circuits	3 N/O
No. of additional circuits	-
Indicators	3 LED
Power supply AC/DC	24V
Synchro time between inputs	Infinite
Response time	< 40 ms
AC-15 breaking capacity	C300
DC-13 breaking capacity	24V/1.5A - L/R 50ms
Minimum voltage and current	17V/10mA
Dimensions (mm)	114 x 22,5 x 99
Connection	Captive screw-clamp terminals
Degree of protection	IP20 (terminals) IP40 (casing)

Generic description of the product

Preventa XPS security light barrier monitoring module for monitoring circuits to protect access to a danger zone. Depending on the model they meet the requirements of a category 2 or 4 (maximum) solution according to EN954-1.

Power Supply Phaseo: ABL7RE2403 and ABL7RE2405

- 100..240V AC / 24V DC
- 3A with 5A secondary
- Narrow fitting
- Parallel wiring possible
- Short circuit and power surge protected

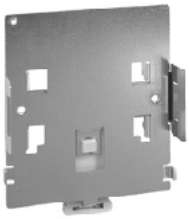
Components Contd.

Display terminal Magelis XBT-G2330

- Sensor screen (TFT-Technology) with 24V DC power supply
- Brightness and Contrast adjustment
- Communication via Uni-Telway, Modbus and in cases via Ethernet TCP/IP
- Flat Profile
- Memory expansion for application program
- Temperature range: 0..+ 50°C
- Certificates: UL, CSA

VSD Altivar: ATV31H037N4 and ATV31H055N4

- 0,37 kW / 0,55kW, 380..500V AC 3 phase
- Integriated class B EMC Filter
- Temperature range: - 10..+ 50°C
- Speed Range: 1 to 20 (0...200 Hz)
- Speed control using Flow Vector control
- Modbus and CANopen compatible
- 2 analog inputs, 1 analog output
- 6 Digital inputs
- 2 / 3 digital stati outputs possible
- Drive and motor protection
- Compact format, side by side installation possible, using adapter VW3A11852 can be mounted on a DIN rail



Magnetic Circuit breaker: GV2L07 and GV2L08

- 2,5 A / 4,0 A
- Short circuit protected
- Magnetic cut off at 33,5 A
- lockable

Contact

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